

Construction noise and vibration Monthly Report – March 2021

London Borough of Camden

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Non-Technical Summary

This Noise and Vibration Monitoring Report fulfils HS2 Limited's commitment detailed in the Environmental Minimum Requirements (EMRs), Annex 1, Code of Construction Practice, to present the results of noise and vibration monitoring carried out within the London Borough of Camden during the month of March 2021.

Within this period monitoring was undertaken at the following worksites:

- Noise monitoring was undertaken in the vicinity of The Adelaide Road Ventilation Shaft (ref.: ARVS), where trench excavations, relocation of power cables, groundworks, concrete foundations works, vegetation clearance, hoarding works, CCTV installation and surveys were underway.
- Noise monitoring was undertaken in the vicinity of Euston Throat Retained Cut and Granby Terrace Bridge worksite (ref.: ETRC & GTB) where guide wall construction, silo installation and grouting, excavations, ground compaction, piling and preparation for bridge and parapet removal were underway.
- Noise monitoring was undertaken in the vicinity of Euston Scissor Cut worksite (ref.: ESC) where piling, removal of waste materials, pile mat installation, guide wall construction, surveys, haul road maintenance and installation of ramp access were underway.
- Noise and vibration monitoring was undertaken in the vicinity of the Hampstead Road Bridge worksite (ref.: HRB) where installation of hauling, installation of haul road access and installation of traffic management systems were underway.
- Noise and vibration monitoring was undertaken in the vicinity of the Euston Cavern worksite (ref.: ECAV), where testing of ground anchors, bridge investigations and hoarding works were underway.
- Noise monitoring was undertaken in the vicinity of On-Network worksites (ref.: B, C, D, E, F, G and H), where:
 - ground, bridge and retaining wall investigations (worksites C, D, E, F, G & H);
 - overhead line equipment inspections and adjustments (worksites C, D, E F & G);
 - cable / signal recoveries and drainage works (worksites C, D & E);
 - cable management system installation, rainwater pipe installation, cutline installation and demolition works (worksites G and H);
 - cable pulling and snagging (worksite E);
 - signalhead and fencing installation (worksite G); and
 - mechanical, electrical and public health assets installation (worksite H) were underway.

- Noise monitoring was undertaken in the vicinity of the 140 Hampstead Road and Power Signal Box worksite (ref.: S001-WS02), where groundworks, pile cap removal and minor demolitions were underway.
- Noise and vibration monitoring were undertaken in the vicinity of the Wolfson House, Walkden House, 67-75 & 77-79 Euston Road worksite (ref.: S003-WS03) where excavation of utility trenches and groundworks were underway.
- Noise monitoring was undertaken in the vicinity of the Former National Temperance Hospital, 110 Hampstead Road worksite (ref.: S003-WS06), where deliveries were underway.
- Noise monitoring was undertaken in the vicinity of the Former National Temperance Hospital - Euston North worksite (ref.: NTH-EN), where site setup and maintenance, hoarding works, relocation of containers and, implementing site power connections, tree cutting, and removal of non-structural building elements prior to demolition were underway.
- Noise monitoring was undertaken in the vicinity of the Euston Towers Demolition worksite (ref.: ETD), where creation of trial holes and removal of non-structural building elements of basement rooms prior to demolition were underway.
- Noise monitoring was undertaken in the vicinity of the Vehicle Holding Area worksite (ref.: VHA), where concrete slab construction and site setup were underway.
- Noise monitoring was undertaken in the vicinity of the Traction Substation worksite (ref.: TSS), where site setup, deliveries and acoustic tests of shaft works enclosure were underway.
- Noise monitoring was undertaken in the vicinity of the Interim Taxi Rank worksite (ref.: ITR), where site setup, deliveries, installation of concrete slabs, groundworks, creation of trial holes, removal of tree stumps and waste wood, soil testing, ground reduction works and installation of foundation root protection system were underway

Further works were also undertaken at:

- Hampstead Road, Stephenson Way, Melton Street, North Gower Street, Regnart Buildings and Harrington Street, where utilities works were underway.

The HS2 threshold levels for significant noise impacts, which are defined in Information Paper E23 (<https://www.gov.uk/government/publications/hs2-information-papers-environment>) were exceeded on fourteen (14) occasions due to HS2 works in the Local Authority Area during March 2021.

There were no exceedances of trigger levels as defined in section 61 consents during the reporting period.

Fifteen (15) complaints were received during the monitoring period. A description of complaints, the results of investigations and any actions taken are detailed in Table 8 of this report.

Abbreviations and Descriptions

The abbreviations, descriptions and project terminology used within this report can be found in Table 1.

Table 1: Table of Abbreviations

Acronym/Term	Definition
$L_{Aeq,T}$	See equivalent continuous sound pressure level
Ambient sound	A description of the all-encompassing sound at a given location and time which will include sound from many sources near and far. Ambient sound can be quantified in terms of the equivalent continuous sound pressure level, $L_{pAeq,T}$
Decibel(s), or dB	Between the quietest audible sound and the loudest tolerable sound there is a million to one ratio in sound pressure (measured in Pascal (Pa)). Because of this wide range, a level scale called the decibel (dB) scale, based on a logarithmic ratio, is used in sound measurement. Audibility of sound covers a range of approximately 0-140dB.
Decibel(s) A-weighted, or dB(A)	The human ear system does not respond uniformly to sound across the detectable frequency range and consequently instrumentation used to measure sound is weighted to represent the performance of the ear. This is known as the 'A weighting' and is written as 'dB(A)'.
Equivalent continuous sound pressure level, or $L_{Aeq,T}$	An index used internationally for the assessment of environmental sound impacts. It is defined as the notional unchanging level that would, over a given period of time (T), deliver the same sound energy as the actual time-varying sound over the same period. Hence fluctuating sound levels can be described in terms of an equivalent single figure value, typically expressed as a decibel level.
Exclusion of data	Measurement of noise levels can be affected by weather conditions such as prolonged periods of rain, winds speeds higher than 5m/s and snow/ice ground cover. Noise levels measured during these periods are considered not representative of normal noise conditions at the site and, for the purposes of this report, are excluded from the assessment of exceedances and calculation of typical noise levels and are also greyed out in charts. Identifiable incongruous noise and vibration events not attributable to HS2 construction noise are also excluded.
Façade	A facade noise level is the noise level 1m in front of a large reflecting surface. The effect of reflection, is to produce a slightly higher (typically +2.5 to +3 dB) sound level than it would be if the reflecting surface was not there.
Free-field	A free-field noise level is the noise level measured at a location where no reflective surfaces, other than the ground, lies within 3.5 metres of the microphone position.
LOAEL	Lowest Observed Adverse Effect Level - the level above which adverse effects on health and quality of life can be detected.
Peak particle velocity, or PPV	Instantaneous maximum velocity reached by a vibrating element as it oscillates about its rest position. The PPV is a simple indicator of perceptibility and risk of damage to structures due to vibration. It is usually measured in mm/s.
SOAEL	Significant Observed Adverse Effect Level - the level above which significant adverse effects on health and quality of life occur.
Sound pressure level	The parameter by which sound levels are measured in air. It is measured in decibels. The threshold of hearing has been set at 0dB, while the threshold of pain is approximately 120dB. Normal speech is approximately 60dB at a distance of 1 metre and a change of 3dB in a time varying sound signal is commonly regarded as being just detectable. A change of 10dB is subjectively twice, or half, as loud.
Vibration dose value, or VDV	An index used to evaluate human exposure to vibration in buildings. While the PPV provides information regarding the magnitude of single vibration events, the VDV provides a measure of the total vibration experienced over a specified period of time (typically 16h daytime and 8h night-time). It takes into account the magnitude, the number and the duration of vibration events and can be used to quantify exposure to continuous, impulsive, occasional and intermittent vibration. The vibration dose value is measured in $m/s^{1.75}$.

1 Introduction

1.1.1 HS2 is required to undertake noise (and vibration) monitoring as necessary to comply with the requirements of the High Speed Rail (London-West Midlands) Environmental Minimum Requirements, including specifically Annex 1: Code of Construction Practice, in addition to any monitoring requirements arising from conditions imposed through consents under Section 61 of the Control of Pollution Act, 1974 or through Undertakings & Assurances given to third parties. Such monitoring may be undertaken for the following purposes:

- monitoring the impact of construction works;
- to investigate complaints, incidents and exceedance of trigger levels; or
- monitoring the effectiveness of noise and vibration control measures.

Monitoring data and interpretive reports are to be provided to each relevant local authority on a monthly basis and shall include a summary of the construction activities occurring, the data recorded over the monitoring period, any complaints received, any periods in exceedance of agreed trigger levels, the results of any investigations and any actions taken or mitigation measures implemented. This report provides noise data, and interpretation thereof, for monitoring carried out by HS2 within the London Borough of Camden (LBC) for the period 1st to 31st March 2021.

1.1.2 Active construction sites in the local authority area where monitoring was undertaken during this period include:

- The Adelaide Road ventilation shaft, (see plan 2 in Appendix A), where work activities included:
 - trench excavations;
 - relocation of power cables;
 - groundworks (backfilling);
 - concrete foundation works (concrete cutting, breaking and pouring);
 - vegetation clearance;
 - hoarding works;
 - CCTV installation; and
 - surveys (asbestos and wall investigations).
- Euston Throat Retained Cut and Granby Terrace Bridge worksite ref.: ETRC & GTB (see plan 2 in Appendix A), where work activities included:
 - guide wall construction;
 - polymer silo installation and grouting;
 - excavations;

- ground compaction;
- continuous flight auger (CFA) piling and sheet piling; and
- preparations for the removal of Granby Terrace bridge and parapets.
- Euston Scissor Cut worksite ref.: ESC (see plan 2 in Appendix A), where work activities included:
 - CFA and sheet piling;
 - removal of waste materials from site;
 - pile mat installation;
 - guide wall construction;
 - track surveys;
 - haul road maintenance; and
 - installation of access ramp.
- Hampstead Road Bridge worksite ref.: HRB (see plan 3 in Appendix A), where work activities included:
 - installation of hoarding and haul road access; and
 - installation of traffic management systems.
- Euston Cavern worksite ref.: ECAV (see plan 3 in Appendix A), where work activities included:
 - testing of ground anchors;
 - bridge investigations; and
 - hoarding works.
- On-Network worksites ref.: C, D, E, F, G and H (see plan 3 in Appendix A), where work activities included:
 - ground, bridge and retaining wall investigations (worksites C, D, E, F, G & H);
 - overhead line equipment inspections and adjustments (worksites C, D, E F & G);
 - cable / signal recoveries and drainage works (worksites C, D & E);
 - cable management system and rainwater pipe installation (worksites G and H);
 - cutline installation and demolition works (worksites G & H);
 - cable pulling and snagging (worksite E);
 - signalhead and fencing installation (worksite G); and
 - mechanical, electrical and public health assets installation (worksite H).
- 140 Hampstead Road and Power Signal Box worksite ref.: S001-WS02 (see plan 2 in Appendix A), where work activities included:
 - groundworks (ground remediation); and

- pile cap removal enabling works including preparation of pile mats and minor demolition works.
- Wolfson House, Walkden House, 67-75 & 77-79 Euston Road worksite ref.: S003-WS03 (see plan 3 in Appendix A), where work activities included:
 - excavation of utilities trenches; and
 - groundworks (backfilling and propping).
- Former National Temperance Hospital, 110 Hampstead Road worksite ref.: S003-WS06 (see plan 3 in Appendix A), where work activities included:
 - deliveries.
- Former National Temperance Hospital - Euston North worksite ref.: NTH-EN (see plan 3 in Appendix A), where work activities included:
 - set-up of structural soil compound;
 - hoarding works;
 - relocation of containers and implementing site power connections;
 - tree cutting;
 - removal of non-structural building elements prior to demolition; and
 - site maintenance.
- Euston Towers Demolition worksite ref.: ETD (see plan 3 in Appendix A), where work activities included:
 - creation of trial holes to identify locations of existing piles; and
 - removal of non-structural building elements of basement rooms prior to demolition.
- Vehicle Holding Area worksite ref.: VHA (see plan 1 in Appendix A), where work activities included:
 - steel fixing of concrete slabs;
 - concrete pouring; and
 - site setup.
- Traction Substation worksite ref.: TSS (see plan 3 in Appendix A), where work activities included:
 - site setup;
 - deliveries; and
 - acoustic tests of shaft works enclosure.
- Interim Taxi Rank worksite ref.: ITR (see plan 3 in Appendix A), where work activities included:
 - set up of site compound;
 - deliveries;
 - installation of concrete slab at entry gate;
 - groundworks (backfill and compaction of shafts and tunnels);

- creation of trial holes to locate utilities and foundations;
- removal of tree stumps and waste wood;
- soil bearing capacity testing;
- ground reduction works; and
- installation of foundation root protection system.

1.1.3 Further works, where monitoring did not take place, were also undertaken at the following locations:

- Hampstead Road, Stephenson Way, Melton Street, North Gower Street, Ragnart Buildings and Harrington Street, where utilities works were undertaken.

1.1.4 The applicable standards, guidance, and monitoring methodology is outlined in the construction noise and vibration monitoring methodology report which can be found at the following location <https://www.gov.uk/government/collections/monitoring-the-environmental-effects-of-hs2>. Noise and vibration monitoring reports for previous months can also be found at this location.

1.2 Measurement Locations

1.2.1 Thirty-two (32) noise and nine (9) vibration monitoring installations were active across fifteen (15) worksites in March in the LBC area. Table 2 summarises the position of noise and vibration monitoring installations within the LBC area in March 2021.

1.2.2 An additional worksite, Traction Substation worksite (ref.: TSS) became active in the month of March. Worksite TSS will overtime expand in size and eventually replace worksite S003-WS03.

1.2.3 Two additional vibration monitors, SH-V1 and PVS-V1, were installed in the month of March adjacent to worksites ETRC and ESC respectively.

1.2.4 Due to a coupling issue at the interface between vibration monitor V039 and the ground no valid data was collected at this location from the start of the month until 17:00 on Tuesday 23rd March. The vibration monitor was relocated to a location which provided better coupling and therefore allowed reliable data to be measured from 17:00 on Tuesday 23rd March onwards.

1.2.5 Maps showing the position of noise and vibration monitoring installations are presented in Appendix B.

Table 2: Monitoring Locations

Worksite Reference	Measurement Reference	Address
ARVS	N051	Outside 70 Adelaide Road

Worksite Reference	Measurement Reference	Address
	N052	Adelaide Road-Beaumont Walk
B	JC	Juniper Crescent
ESC	N024	External to Park Village Studios, Park Village East
	N047	Park Village East/Mornington Street bridge, lamppost #13
	PVS-V1	Park Village Studios
ESC, C	N022	External to 34 Mornington Terrace
	N046	Mornington Terrace near The Edinboro Castle pub, lamppost #18
ETRC & GTB	N001	Park Village East, lamppost #1 (external to Cubitt Court, 100 Park Village East)
	N002	Park Village East, lamppost #2 (external to Richmond Court)
	N003	Park Village East, lamppost #9 (external to Silsoe House)
	SH-V1	Silsoe House
ETRC & GTB, D	N004	Mornington Terrace, lamppost #7 (junction of Mornington Terrace, Mornington Place and Clarkson Row)
ETRC & GTB, E	N005	5A Granby Terrace
ETRC & GTB, F	N023	Lamppost #21 on Hampstead Road
HRB	N020	Mackworth Street, lamppost #1
	N021	Stanhope Street, lamppost #2
	N044	Regents Park Estate west, near Langdale
	N045	Regents Park Estate south, external to Coniston
	V039	Coniston, Regents Park Estate
	V043	Cubitt Court, Park Village East
G	HH	Euston Station Parcel Deck, Barnby Street
	BS	Roof of Stockbeck House, Barnby Street
S001-WS02	N018	Outside replacement housing, Hampstead Road
	N019	Outside Cartmel, Hampstead Road
S003-WS03, ETD, TSS	N006	Royal College of General Practitioners roof level
S003-WS03, TSS	N008	Stephenson's Way lamppost (external to RCGP)
	N010	Wesley Hotel
	N011	Euston Street, lamppost #4 (external to 82 Euston Street)
S003-WS03	V002	Royal College of General Practitioners basement boiler room by Stephenson Way
	V037	Magic Circle, basement
	V038	Wesley Hotel, basement lightwell, Euston Street
S003-WS03, ETD	N007	Royal College of General Practitioners, Melton Street
	V003	Royal College of General Practitioners basement vaults under Melton St

Worksite Reference	Measurement Reference	Address
Vehicle Holding Area (VHA)	N025	External to 3 Prince Albert Road
	N026	Thames Water Compound
NTH-EN, TSS	N012	Drummond Street, lamppost #14 (opposite to 92-94 Drummond Street)
NTH-EN	N014	Starcross Street lamppost (external to Exmouth Arms)
	N016	Margaret Centre roof
	N017	Hampstead Road, lamppost #48
	V021	42-44 Cobourg Street

2 Summary of Results

2.1 Summary of Measured Noise and Vibration Levels

2.1.1 Table 3 presents a summary of the measured noise levels at each monitoring location over the reporting period. The $L_{Aeq,T}$ is presented for each of the relevant time periods averaged over the calendar month, along with the highest single period $L_{Aeq,T}$ that was found to occur within the month.

Table 3: Summary of Measured dB LAeq Data over the Monitoring Period

Worksite Reference	Measurement Reference	Site Address	Free-field or Façade Measurement	Weekly Average LAeq,T (Highest Day LAeq,T)					Saturday Average LAeq,T (highest day LAeq,T)					Sunday / Public Holiday Average LAeq,T (highest day LAeq,T)	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
ARVS	N051	Outside 70 Adelaide Road	Free-field	68.3 (72.3)	68.5 (70.8)	68.0 (75.2)	67.6 (72.8)	64.4 (74.2)	66.1 (67.2)	67.5 (67.8)	68.6 (68.8)	68.1 (70.5)	65.0 (71.7)	67.8 (72.8)	63.8 (71.0)
	N052	Adelaide Road-Beaumont Walk	Free-field	66.2 (70.5)	67.8 (73.4)	66.6 (75.4)	65.9 (74.9)	62.0 (68.7)	64.4 (65.6)	65.6 (66.4)	66.3 (66.8)	66.4 (71.3)	61.9 (66.0)	65.1 (71.6)	61.7 (69.1)
B	JC	Juniper Crescent	Free-field	56.9 (62.9)	56.9 (61.5)	55.9 (58.2)	56.9 (60.1)	54.1 (60.2)	57.1 (58.8)	57.0 (59.9)	54.8 (56.6)	55.9 (57.7)	52.9 (58.5)	55.3 (60.1)	52.6 (61.2)
ESC	N024	External to Park Village Studios, Park Village East	Free-field	59.9 (62.7)	61.1 (74.6)	59.2 (66.9)	57.3 (63.0)	54.0 (75.0)	56.4 (58.4)	57.5 (58.4)	58.2 (58.6)	58.6 (65.7)	52.1 (56.9)	56.7 (62.2)	52.0 (58.7)
	N047	Park Village East/Mornington Street bridge, lamppost #13	Free-field	59.5 (64.4)	61.7 (65.5)	60.0 (62.9)	58.1 (62.8)	53.6 (61.4)	56.4 (57.9)	59.3 (62.5)	61.1 (66.0)	58.8 (61.9)	52.6 (56.6)	57.2 (60.9)	52.8 (60.8)
ESC, C	N022	External to 34 Mornington Terrace	Free-field	59.2 (63.8)	60.3 (63.1)	58.8 (63.2)	57.8 (62.0)	54.1 (66.2)	58.2 (59.9)	58.9 (60.3)	58.6 (60.0)	58.7 (65.6)	52.5 (57.8)	56.9 (60.0)	53.8 (58.1)
	N046	Mornington Terrace near The Edinboro Castle pub, lamppost #18	Free-field	62.1 (65.5)	62.2 (63.6)	61.2 (62.6)	60.5 (62.7)	56.9 (63.9)	61.8 (62.8)	61.3 (62.3)	61.0 (61.8)	60.6 (63.4)	55.1 (61.3)	59.8 (62.4)	56.7 (64.7)
ETRC & GTB	N001	External to Cubitt Court, 100 Park Village East	Free-field	59.4 (63.9)	67.2 (70.1)	60.6 (65.9)	57.6 (62.0)	52.6 (60.2)	55.5 (56.2)	62.8 (64.5)	58.8 (60.4)	58.2 (65.0)	53.4 (62.3)	56.3 (59.0)	51.6 (58.6)
	N002	Richmond Court, Park Village East	Free-field	59.0 (67.0)	64.4 (70.0)	61.0 (63.2)	58.0 (61.1)	53.1 (61.6)	55.3 (56.7)	59.6 (61.7)	59.6 (60.1)	58.7 (60.5)	53.2 (59.4)	57.3 (60.3)	52.3 (56.8)

Worksite Reference	Measurement Reference	Site Address	Free-field or Façade Measurement	Weekly Average $L_{Aeq,T}$ (Highest Day $L_{Aeq,T}$)					Saturday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$)					Sunday / Public Holiday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$)	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
	N003	Silsoe House, Park Village East	Façade	59.9 (64.6)	65.3 (74.6)	61.3 (63.0)	58.9 (63.2)	53.7 (61.6)	56.4 (57.2)	59.3 (59.7)	60.3 (60.9)	59.5 (61.2)	53.8 (58.5)	58.1 (61.3)	52.7 (57.2)
ETRC & GTB, D	N004	Mornington Terrace, lamppost #7	Free-field	64.1 (68.6)	68.5 (86.6)	64.2 (69.5)	63.4 (74.4)	60.1 (68.2)	63.0 (63.5)	65.5 (66.8)	63.5 (64.4)	63.7 (69.2)	58.8 (66.7)	62.9 (68.3)	60.2 (65.5)
ETRC & GTB, E	N005	5A Granby Terrace	Free-field	66.0 (69.2)	69.4 (74.3)	64.9 (68.5)	63.5 (66.7)	62.8 (67.5)	65.5 (65.6)	66.4 (66.8)	64.2 (64.8)	63.7 (65.3)	62.6 (67.0)	63.1 (65.9)	62.0 (65.2)
ETRC & GTB, F	N023	Lamppost #21 on Hampstead Road	Free-field	70.0 (73.2)	70.6 (71.7)	69.7 (76.5)	68.2 (75.9)	65.3 (72.9)	69.4 (70.2)	69.2 (70.8)	68.3 (68.7)	68.9 (72.1)	65.8 (67.2)	68.1 (74.9)	64.4 (68.5)
HRB	N020	Mackworth Street, lamppost #1	Free-field	54.7 (59.8)	64.3 (68.9)	53.9 (58.6)	51.5 (59.0)	50.0 (81.3)	53.2 (56.8)	59.0 (60.7)	54.0 (58.2)	52.1 (60.1)	48.4 (51.5)	51.1 (54.2)	48.3 (54.6)
	N021	Stanhope Street, lamppost #2	Free-field	59.4 (65.2)	66.2 (71.0)	59.1 (64.3)	56.3 (61.8)	52.4 (64.1)	54.8 (57.3)	60.4 (61.3)	58.8 (59.9)	57.0 (60.0)	52.3 (56.0)	55.7 (58.8)	53.3 (68.6)
	N044	Regents Park Estate west, near Langdale	Free-field	56.9 (68.6)	71.4 (75.3)	57.7 (69.7)	51.6 (68.3)	48.0 (54.9)	52.0 (58.7)	68.4 (72.8)	56.2 (70.0)	51.2 (58.4)	47.7 (53.5)	49.8 (57.9)	46.5 (54.4)
	N045	Regents Park Estate south, external to Coniston	Free-field	61.7 (67.8)	68.9 (72.3)	59.3 (64.5)	55.5 (58.7)	53.4 (62.9)	57.5 (59.9)	66.0 (66.8)	59.2 (62.6)	57.4 (65.1)	53.6 (59.7)	56.2 (59.9)	53.4 (62.4)
G	HH	Euston Station Parcel Deck, Barnby Street	Free-field	59.6 (61.4)	61.4 (63.5)	62.5 (66.1)	59.8 (67.0)	56.9 (71.6)	60.0 (63.0)	61.5 (64.4)	59.6 (61.9)	61.0 (68.0)	56.2 (59.7)	60.4 (66.5)	56.0 (60.7)
	BS	Roof of Stockbeck House, Barnby Street	Free-field	61.2 (66.0)	62.2 (64.5)	61.3 (64.4)	60.9 (64.3)	56.8 (63.4)	60.8 (60.9)	62.0 (63.0)	61.2 (62.5)	60.7 (63.5)	56.7 (62.8)	60.1 (63.4)	56.8 (61.0)
S001-WS02	N018	Outside replacement housing, Hampstead Road	Free-field	69.5 (72.1)	70.9 (72.8)	70.3 (76.6)	69.0 (75.3)	65.9 (72.8)	69.3 (71.7)	68.1 (69.0)	68.0 (68.6)	69.5 (76.8)	66.2 (69.7)	68.4 (75.3)	65.6 (73.4)

OFFICIAL

Worksite Reference	Measurement Reference	Site Address	Free-field or Façade Measurement	Weekly Average $L_{Aeq,T}$ (Highest Day $L_{Aeq,T}$)					Saturday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$)					Sunday / Public Holiday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$)	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
	N019	Outside Cartmel, Hampstead Road	Free-field	57.8 (62.2)	63.4 (66.0)	57.2 (59.2)	55.7 (59.2)	54.8 (62.0)	56.7 (57.3)	61.4 (65.9)	57.8 (60.0)	56.2 (59.9)	54.6 (57.2)	55.5 (57.5)	54.0 (57.2)
S003-WS03, ETD, TSS	N006	Royal College of General Practitioners roof level	Free-field	58.3 (61.6)	63.8 (68.2)	54.8 (57.2)	54.6 (67.0)	54.2 (59.4)	56.7 (59.8)	59.4 (62.5)	56.2 (58.4)	54.5 (57.7)	54.0 (55.7)	54.8 (58.3)	54.0 (57.1)
S003-WS03, TSS	N008	Stephenson's Way lamppost (external to RCGP)	Façade	60.4 (72.0)	74.4 (83.4)	53.7 (55.9)	53.6 (62.7)	53.7 (69.0)	58.0 (63.3)	79.4 (88.0)	68.6 (82.0)	63.3 (79.9)	52.9 (56.6)	59.1 (77.7)	53.1 (69.5)
	N010	Wesley Hotel	Façade	58.3 (65.5)	68.5 (79.6)	51.7 (54.4)	51.6 (66.4)	50.7 (56.5)	58.8 (62.7)	65.2 (69.4)	57.3 (63.3)	52.4 (61.0)	50.4 (51.9)	51.7 (54.8)	50.5 (55.2)
	N011	Outside 82 Euston Street	Free-field	57.8 (64.8)	62.3 (69.3)	56.8 (64.9)	55.1 (61.5)	53.2 (67.9)	54.9 (55.9)	58.9 (62.3)	57.9 (59.3)	55.5 (57.9)	51.3 (54.1)	55.4 (59.5)	53.3 (61.4)
S003-WS03, ETD	N007	Royal College of General Practitioners, Melton Street	Free-field	63.4 (67.8)	66.0 (73.9)	62.2 (63.6)	62.8 (74.7)	60.8 (70.5)	63.9 (66.2)	62.5 (62.9)	62.1 (63.5)	62.0 (65.1)	60.6 (65.3)	61.7 (68.1)	60.2 (66.0)
VHA	N025	External to 3 Prince Albert Road	Free-field	67.4 (68.6)	68.3 (73.7)	66.7 (74.8)	65.8 (71.9)	62.4 (71.6)	64.7 (65.2)	65.8 (66.3)	66.1 (68.6)	67.2 (73.6)	62.3 (67.4)	65.7 (76.7)	62.3 (68.0)
	N026	Thames Water Compound	Free-field	58.0 (61.6)	62.9 (70.4)	56.8 (59.1)	54.9 (59.4)	51.8 (59.5)	55.8 (56.6)	55.8 (57.1)	56.3 (57.4)	56.2 (62.0)	51.6 (59.1)	54.7 (59.6)	50.9 (56.0)

Worksite Reference	Measurement Reference	Site Address	Free-field or Façade Measurement	Weekly Average $L_{Aeq,T}$ (Highest Day $L_{Aeq,T}$)					Saturday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$)					Sunday / Public Holiday Average $L_{Aeq,T}$ (highest day $L_{Aeq,T}$)	
				0700 - 0800	0800 - 1800	1800 - 1900	1900 - 2200	2200 - 0700	0700 - 0800	0800 - 1300	1300 - 1400	1400 - 2200	2200 - 0700	0700 - 2200	2200 - 0700
NTH-EN, TSS	N012	Opposite 92-94 Drummond Street	Free-field	58.0 (62.5)	61.9 (74.2)	57.7 (59.0)	57.8 (63.3)	56.7 (61.2)	57.5 (59.3)	61.0 (64.5)	58.8 (59.1)	58.1 (60.8)	55.7 (57.9)	57.6 (59.6)	56.1 (61.7)
NTH-EN	N014	Starcross Street lamppost (external to Exmouth Arms)	Free-field	55.0 (56.8)	58.9 (64.1)	55.8 (59.7)	53.9 (59.9)	52.0 (59.7)	55.4 (56.5)	56.6 (58.6)	56.4 (56.6)	54.6 (57.2)	50.7 (57.2)	55.0 (62.4)	52.5 (59.2)
	N016	Margaret Centre roof	Free-field	55.8 (66.3)	58.9 (64.1)	54.6 (61.6)	53.2 (59.9)	52.0 (61.7)	54.9 (56.0)	58.5 (65.9)	54.7 (56.2)	54.2 (57.5)	51.7 (53.6)	53.7 (57.4)	51.3 (57.1)
	N017	Hampstead Road, lamppost #48	Free-field	70.2 (72.5)	71.4 (74.9)	70.5 (74.3)	69.1 (73.7)	66.6 (74.5)	69.9 (71.2)	68.8 (69.3)	68.8 (69.6)	70.4 (75.3)	66.3 (69.5)	68.4 (73.5)	66.1 (73.9)

2.1.2 Table 4 presents a summary of the measured vibration levels at each monitoring location over the reporting period. The highest PPV measured during the monitoring along any axis is presented in the table.

Table 4: Summary of Measured PPV Data over the Monitoring Period

Worksite Reference	Measurement Reference	Monitor Address	Highest PPV measured in any axis, mm/s
HRB	V039	Coniston, Regents Park Estate	2.18 (Y-Axis)*
	V043	Cubitt Court, Park Village East	1.45 (X-Axis)
S003-WS03	V002	RCGP basement boiler room, 305 Euston Road	2.58 (Y-axis)
	V003	RCGP basement vaults, 305 Euston Road	0.69 (Y-axis)
	V037	Magic Circle, basement	1.59 (Y-axis)
	V038	Wesley Hotel, basement lightwell, Euston Street	0.92 (Z-axis)
NTH-EN	V021	42-44 Cobourg Street (floor)	0.44 (Z-axis)
ESC	PVS-V1	Park Village Studios	1.17 (X-axis)
ETRC & GTB	SH-V1	Silsoe House	1.20 (X-axis)

* Due to a coupling issue at the interface between the vibration monitor and the ground no valid data was collected at this location between the start of the month until 17:00 on Tuesday 23rd March. The vibration monitor was relocated to a location which provided better coupling and therefore allowed reliable data to be measured from 17:00 on Tuesday 23rd March onwards.

2.1.3 Appendix C presents graphs of the noise and vibration monitoring data over the month for each of the measurement locations. Noise data presented consists of the hourly L_{Aeq} values and, where relevant, the $L_{Aeq,T}$ values (where the time period T has been taken to be the averaging period as specified in Table 1 of HS2 Information Paper E23). Vibration data presented consist of hourly PPV values. The full data set for the monitoring equipment can be found at the following location:

<https://data.gov.uk/dataset/24542ae7-dd44-444f-b259-871c4cc43b5e/environmental-monitoring-data>.

2.2 Exceedances of the SOAEL

2.2.1 The significant observed adverse effect level (SOAEL) is defined in the 'Planning Practice Guidance – Noise' as the level above which "noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area."

2.2.2 HS2 Phase One Information Paper E23: Control of Construction Noise and Vibration sets out the SOAELs for construction noise.

2.2.3 Where construction noise levels exceed the SOAEL, relevant periods will be identified, and summary statistics provided in order to evaluate ongoing qualification for noise insulation and temporary rehousing.

2.2.4 Table 5 presents a summary of recorded exceedances of the SOAEL at each measurement location over the reporting period, including the number of exceedances during each time period.

Table 5: Summary of Exceedances of SOAEL

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
ARVS	N051	Outside 70 Adelaide Road	All days	All periods	No exceedance
	N052	Adelaide Road-Beaumont Walk	All days	All periods	No exceedance
B	JC	Juniper Crescent	All days	All periods	No exceedance
ESC	N024	External to Park Village Studios, Park Village East	All days	All periods	No exceedance
	N047	Park Village East/Mornington Street bridge, lamppost #13	All days	All periods	No exceedance
ESC, C	N022	External to 34 Mornington Terrace	All days	All periods	No exceedance
	N046	Mornington Terrace near The Edinboro Castle pub, lamppost #18	All days	All periods	No exceedance
ETRC & GTB	N001	External to Cubitt Court, 100 Park Village East	Night	2200-0700	4
	N002	Richmond Court, Park Village East	All days	All periods	No exceedance
	N003	Silsoe House, Park Village East	Weekday	0800-1800	2
ETRC & GTB, D	N004	Mornington Terrace, lamppost #7	Saturday	1400-2200	2
			Sunday	0700-2200	5
			Night	2200-0700	4
ETRC & GTB, E	N005	5A Granby Terrace	Weekday	0800-1800	2
			Night	2200-0700	1
ETRC & GTB, F	N023	Lamppost #21 on Hampstead Road	All days	All periods	No exceedance
HRB	N020	Mackworth Street, lamppost #1	All days	All periods	No exceedance
	N021	Stanhope Street, lamppost #2	All days	All periods	No exceedance
	N044		Weekday	08:00-18:00	5

Worksite Reference	Measurement Reference	Site Address	Day (Weekday, Saturday, Sunday, Night)	Time period	Number of exceedances of SOAEL
		Regents Park Estate west, near Langdale	Weekday	1800-1900	1
	N045	Regents Park Estate south, external to Coniston	All days	All periods	No exceedance
G	HH	Euston Station Parcel Deck, Barnby Street	All days	All periods	No exceedance
	BS	Roof of Stockbeck House, Barnby Street	All days	All periods	No exceedance
S001-WS02	N018	Outside replacement housing, Hampstead Road	All days	All periods	No exceedance
	N019	Outside Cartmel, Hampstead Road	All days	All periods	No exceedance
S003-WS03	N006	RCGP Roof level	All days	All periods	Not applicable*
	N008	RCGP Stephenson Way	All days	All periods	No exceedance
	N010	Wesley Hotel	All days	All periods	No exceedance
	N011	Outside 82 Euston Street	All days	All periods	No exceedance
ETD	N007	RCGP, Melton Street	All days	All periods	No exceedance
VHA	N025	External to 3 Prince Albert Road	All days	All periods	No exceedance
	N026	Thames Water Compound	All days	All periods	No exceedance
NTH-EN	N012	Opposite 92-94 Drummond Street	Weekday	0800-1800	1**
	N014	Starcross Street lamppost (external to Exmouth Arms)	All days	All periods	No exceedance
	N016	Margarete Centre roof	All days	All periods	No exceedance
	N017	Hampstead Road, lamppost #48	All days	All periods	No exceedance

* The defined SOAEL criteria are not applicable to non-residential properties.

** Exceedance of the SOAEL was due to utility works happening in close proximity to the monitor, noise levels at the nearest receptor are predicted to be below the SOAEL.

2.2.5 For the purpose of assessing eligibility for noise insulation or temporary rehousing, multiple exceedances of the SOAEL in a 24-hour period would be counted as a single exceedance during that day. Over the reporting period, the overall number of SOAEL exceedances at each measurement location is shown in Table 6 and may be lower than the total sum of individual exceedances reported in Table 5 for each location.

Table 6: Summary of Total Exceedances of SOAEL

Worksite Reference	Measurement Reference	Monitor Address	Total of SOAEL exceedances in the month
ETRC & GTB	N001	External to Cubitt Court, 100 Park Village East	1
	N003	Silsoe House, Park Village East	2
	N005	5A Granby Terrace	3
ETRC & GTB, D	N004	Mornington Terrace, lamppost #7	2
HRB	N044	Regents Park Estate West, near Langdale	6

2.2.6 14 exceedances of the SOAEL were recorded due to HS2 construction works during January 2021. The exceedances occurred at:

- Monitoring location N001 during weekend possession works due to removal of parapets;
- Monitoring location N003 during two weekday daytime periods. The first period was due to use of a roller and cementation and the second was due to wall construction and sheet piling;
- Monitoring location N005 during one period of weekend possession works due to removal of parapets and two weekday daytime periods due to the use of a roller and breaking out activities;
- Monitoring location N004 during two periods of weekend possession works due to removal of parapets; and
- Monitoring location N044 during five weekday daytime periods due to use of a roller, piling and pile mat extensions and during one weekday evening period due to use of a vacuum excavator.

2.3 Exceedances of Trigger Level

2.3.1 Table 7 provides a summary of exceedances of the S61 trigger noise levels determined to be due to HS2 related construction noise measured during the reporting period, along with the findings of any investigation.

Table 7: Summary of Exceedances of Trigger Levels

Complaint Reference Number (if applicable)	Worksite Reference	Date and Time Period	Identified Source	Results of Investigation (including noise monitoring results)	Actions Taken
-	-	-	-	-	-

2.4 Complaints

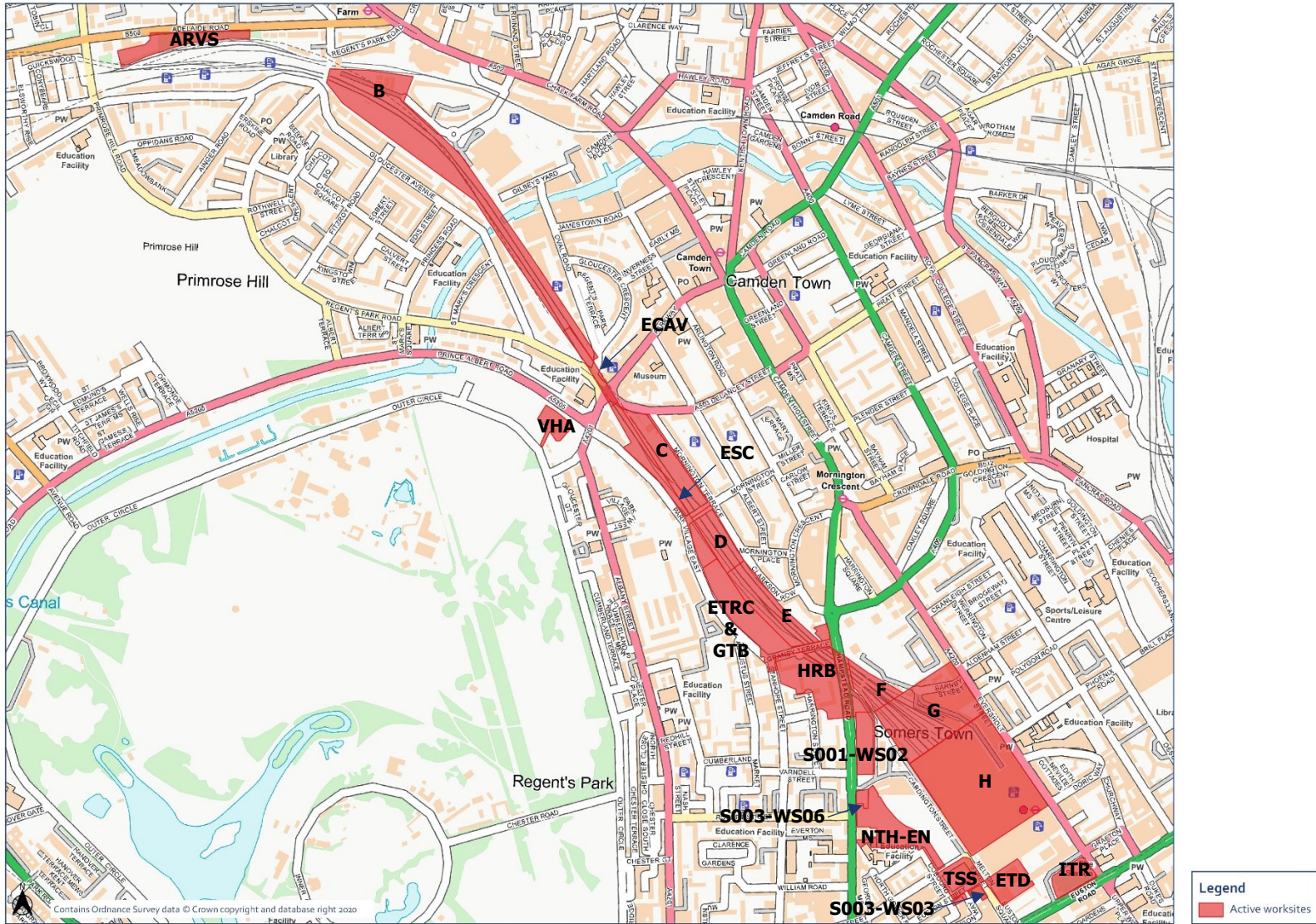
2.4.1 Table 8 provides a summary of complaint information related to noise and vibration received during the reporting period, along with the findings of any investigation.

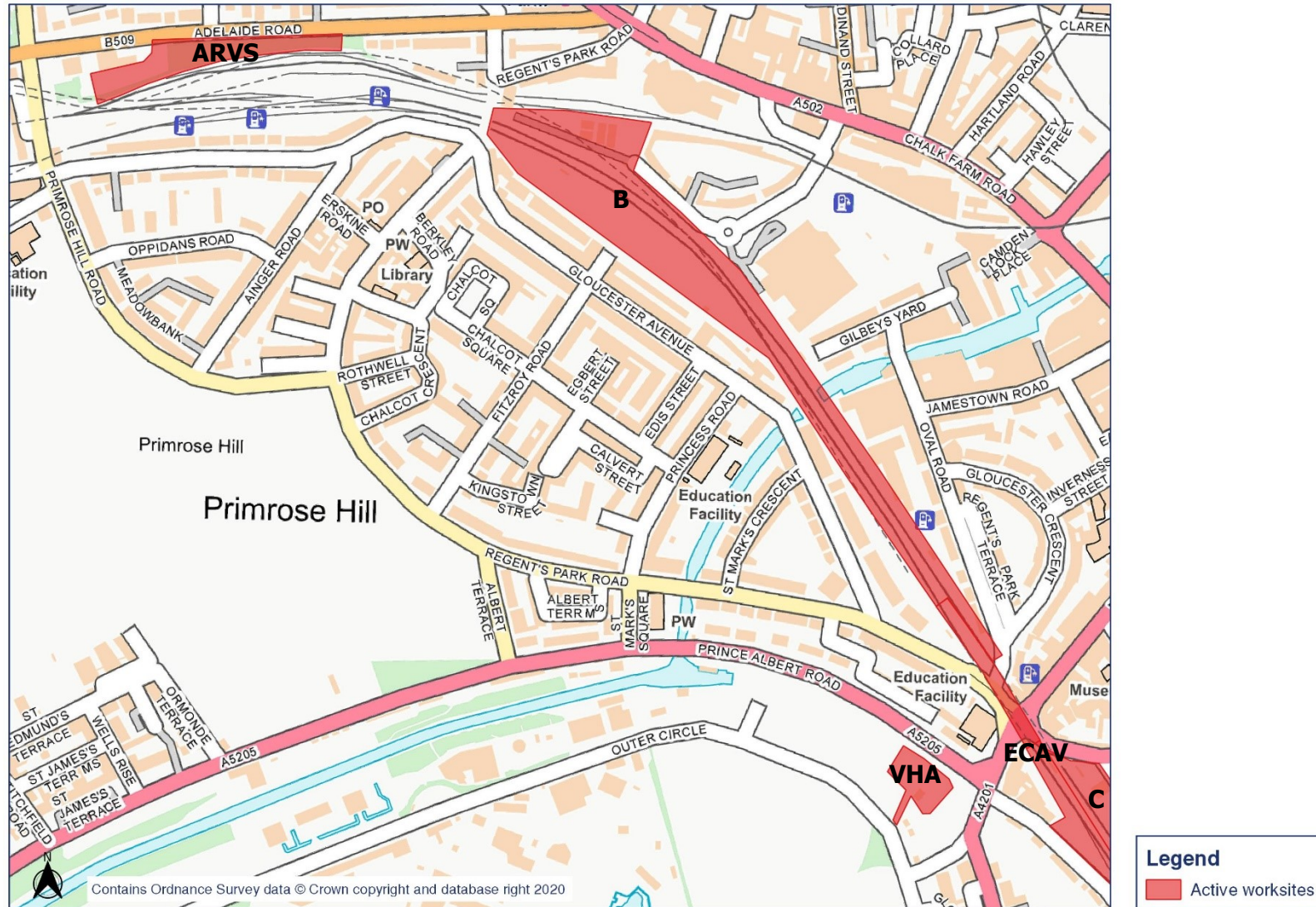
Table 8: Summary of Complaints

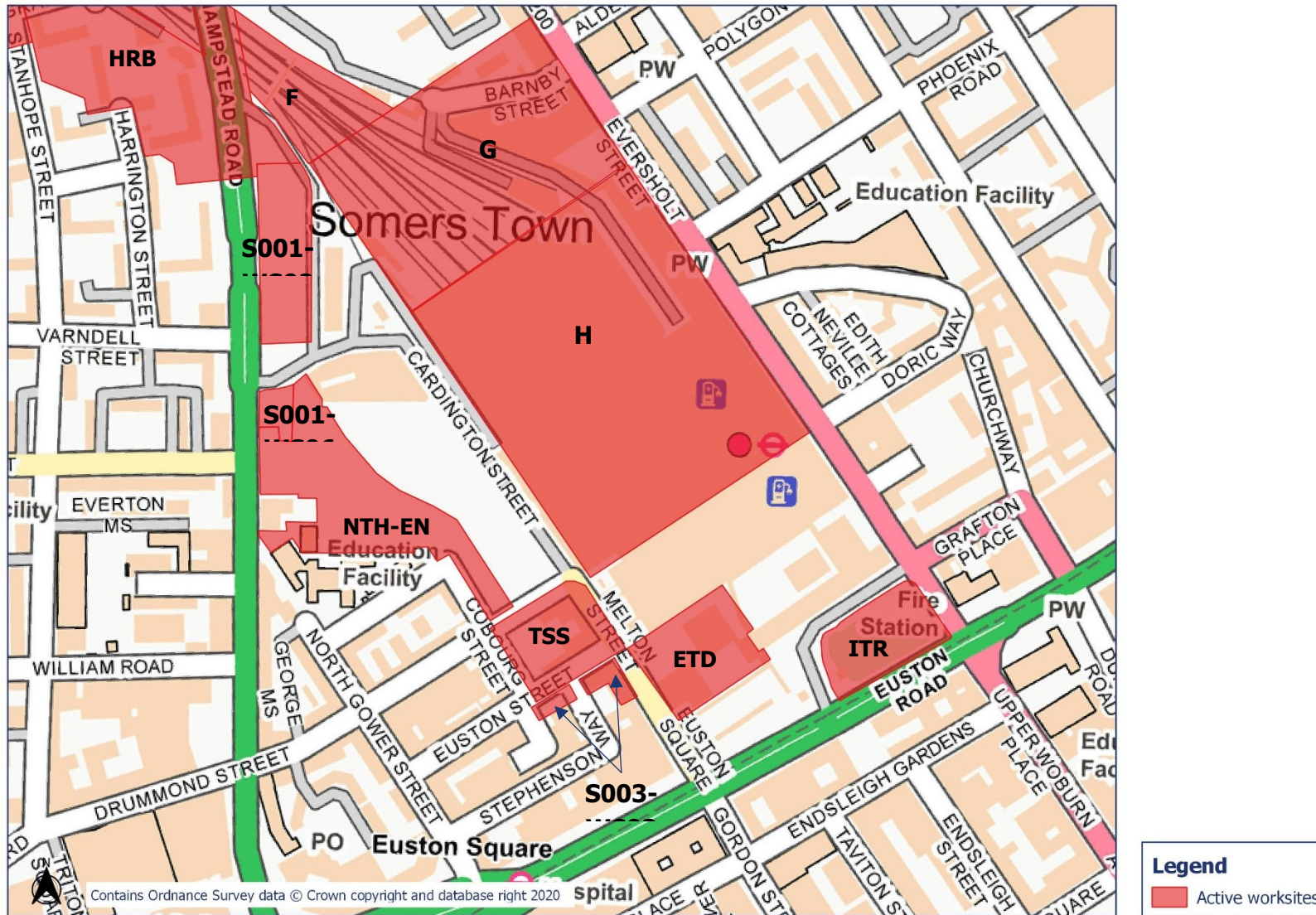
Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-21-41592-C	HRB	Noise arising from a compressor during daytime and night time.	Utilities works employ a compressor during daytime hours. No utilities works on Harrington St were undertaken outside of core working hours.	Site staff were briefed to employ acoustic blankets around the compressor.
HS2-21-41183-C	C	Repeat complaint due to noise and vibration caused by HS2 construction.	Possessions were required to carry out works until 03:00hrs. Residents had been informed by signs placed around the local area that these works were to take place.	Information was provided to the stakeholder outlining the ongoing works and steps the contractor is taking to minimise disruption caused by noise and vibration.
HS2-21-41654-C	ESC	Complaint due to construction noise during the night-time.	On-going.	On-going.
HS2-21-41508-C	E	Complaint due to construction noise during the night-time.	The construction noise was associated with maintenance work and not associated with HS2.	Information was provided to the stakeholder.
HS2-21-41574-C	HRB, S001-WS02	General complaint due to construction noise and vibration.	Noise and vibration may be due to a roller that is used when quieter methods are not feasible. Monitoring data demonstrates compliance with Section 61 requirements.	Information was provided to the stakeholder outlining the steps the contractor is taking to minimise disruption caused by noise and vibration.
HS2-21-41556-C	NTH-EN	General complaint due to construction noise and vibration.	On-going.	On-going.
HS2-21-41519-C	ETRC & GTB, ESC	Complaint due to perceptible construction vibration during the daytime.	The vibrations were caused by piling trials. Monitoring data demonstrates compliance with Section 61 requirements.	Dates and times of upcoming piling were confirmed with the stakeholder.

Complaint Reference Number	Worksite Reference	Description of Complaint	Results of Investigation	Actions Taken
HS2-21-41629-C	ECAV	Complaint due to piling noise.	On-going.	On-going.
HS2-21-41577-C	ECAV	General complaint due to construction noise.	The noise was associated with HS2 construction. Monitoring data demonstrates compliance with Section 61 requirements.	Information was provided to the stakeholder outlining the steps the contractor is taking to minimise disruption caused by noise.
HS2-21-41581-C HS2-21-41541-C	ESC	Complaint due to noise associated with the construction of a prefabricated building.	The work was associated with HS2 construction which involved evening working with hand tools. Monitoring data demonstrates compliance with Section 61 requirements.	Information was provided to the stakeholder.
HS2-21-41526-C	HRB, S001-WS02	Complaint due to an audible high-pitched droning noise during the daytime.	The droning noise was caused by a roller which was used to compact earth. Monitoring data demonstrates compliance with Section 61 requirements.	Information was provided to the stakeholder.
HS2-21-41586-C	ARVS	Complaint due to raised voices within the worksite.	The raised voices were associated with HS2 construction.	The issues of raised voices have since been addressed with site staff by worksite supervisors.
HS2-21-41642-C	HRB, S001-WS02	Complaint due to perceptible vibration caused by drilling.	The drilling was associated with HS2 construction. Monitoring data demonstrates compliance with Section 61 requirements.	Information was provided to the stakeholder outlining the steps the contractor is taking to minimise disruption caused by vibration.
HS2-21-41579-C	HRB, S001-WS02	General complaint due to construction noise perceptibly increasing in level.	The noise was associated with HS2 construction. Monitoring data demonstrates compliance with Section 61 requirements.	Information was provided to the stakeholder outlining the steps the contractor is taking to minimise disruption caused by noise.

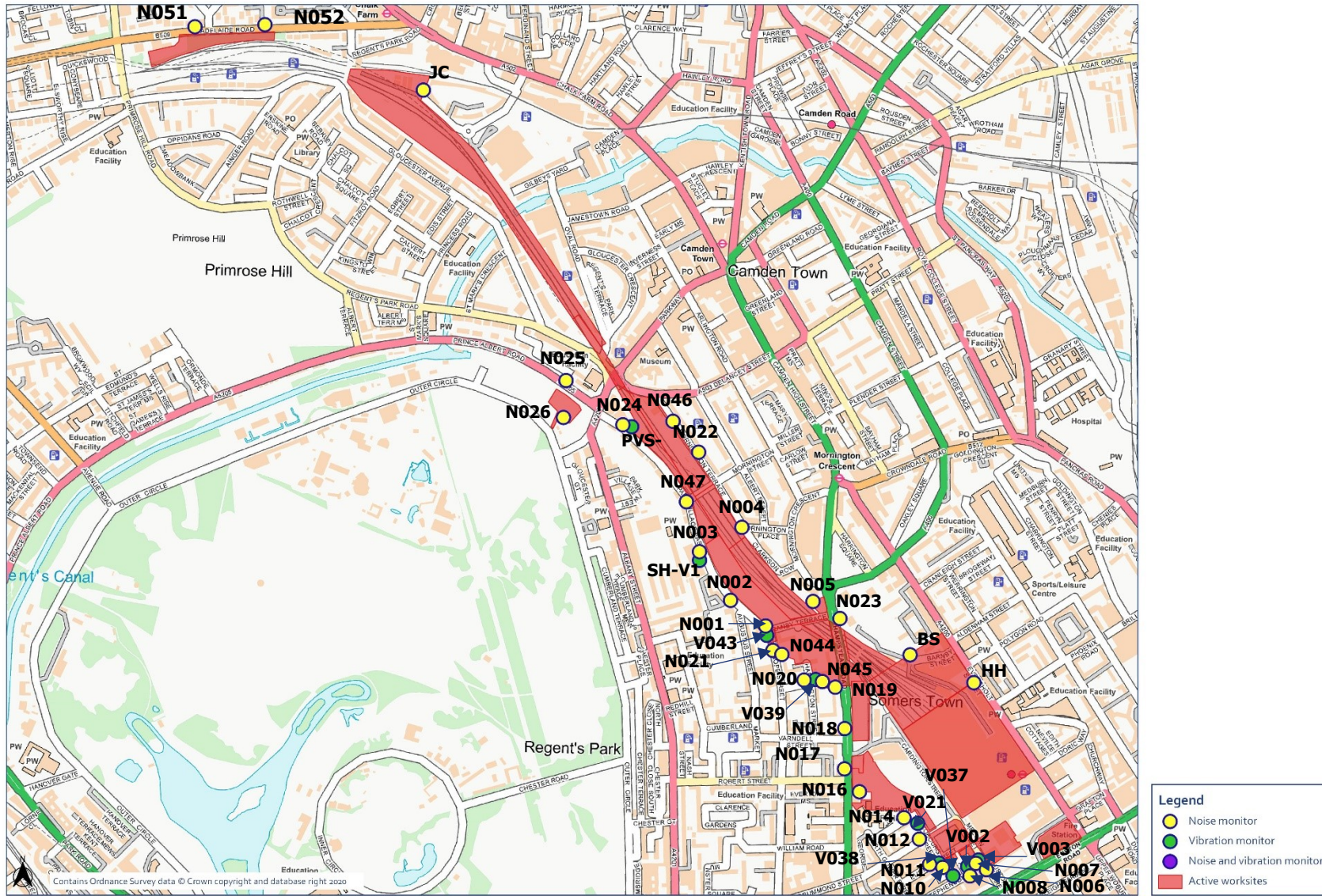
Appendix A Site Locations

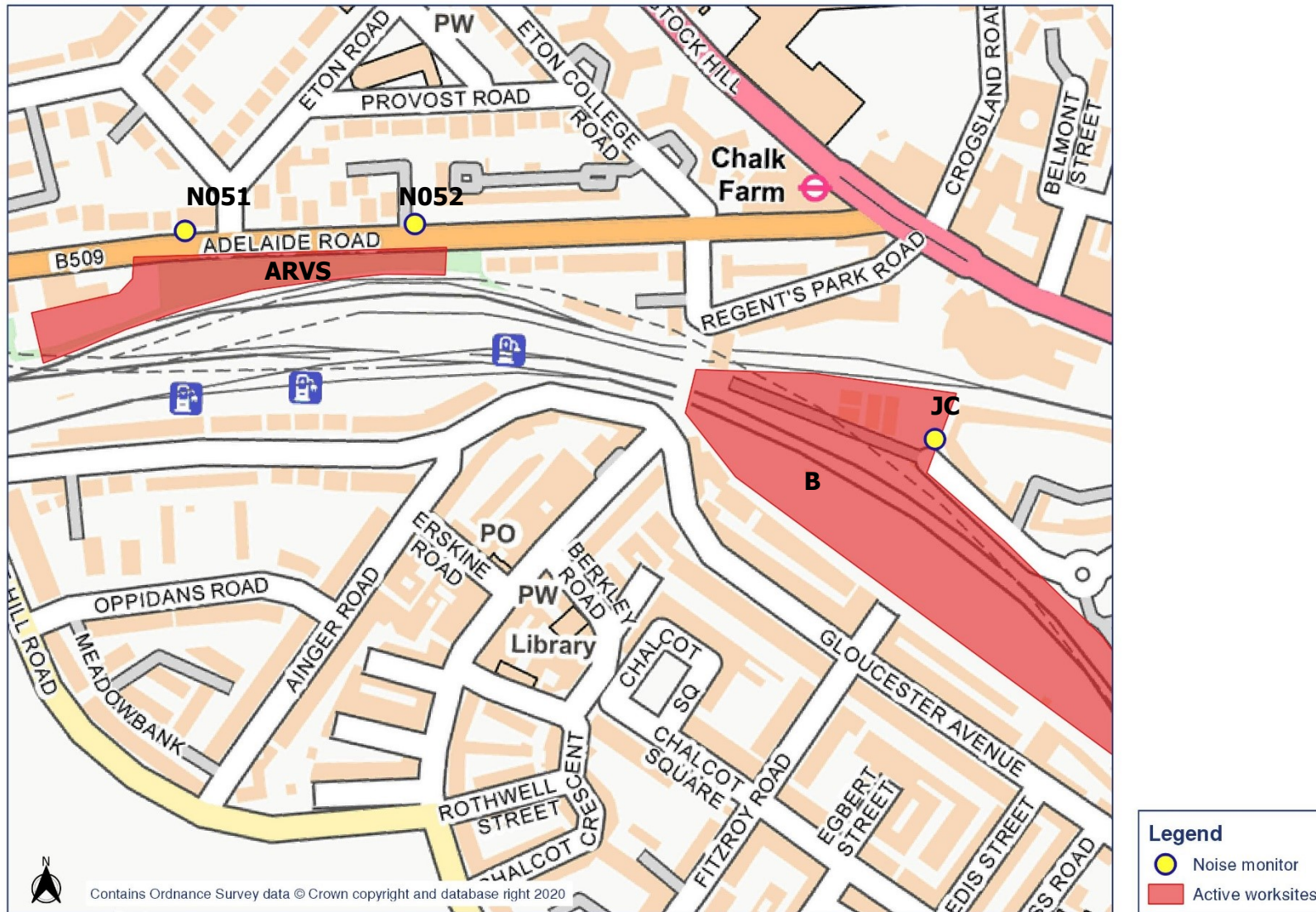


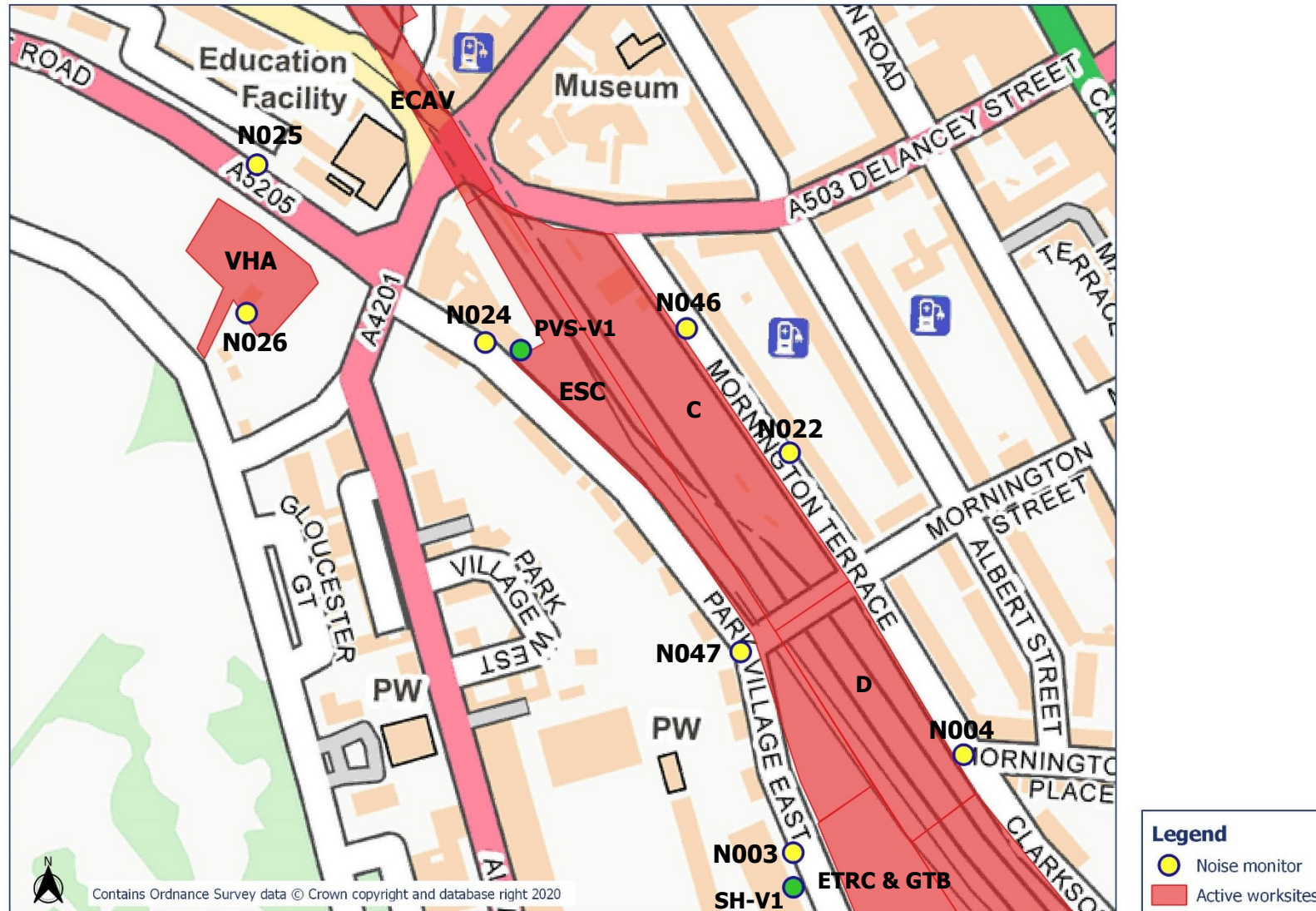




Appendix B Monitoring Locations

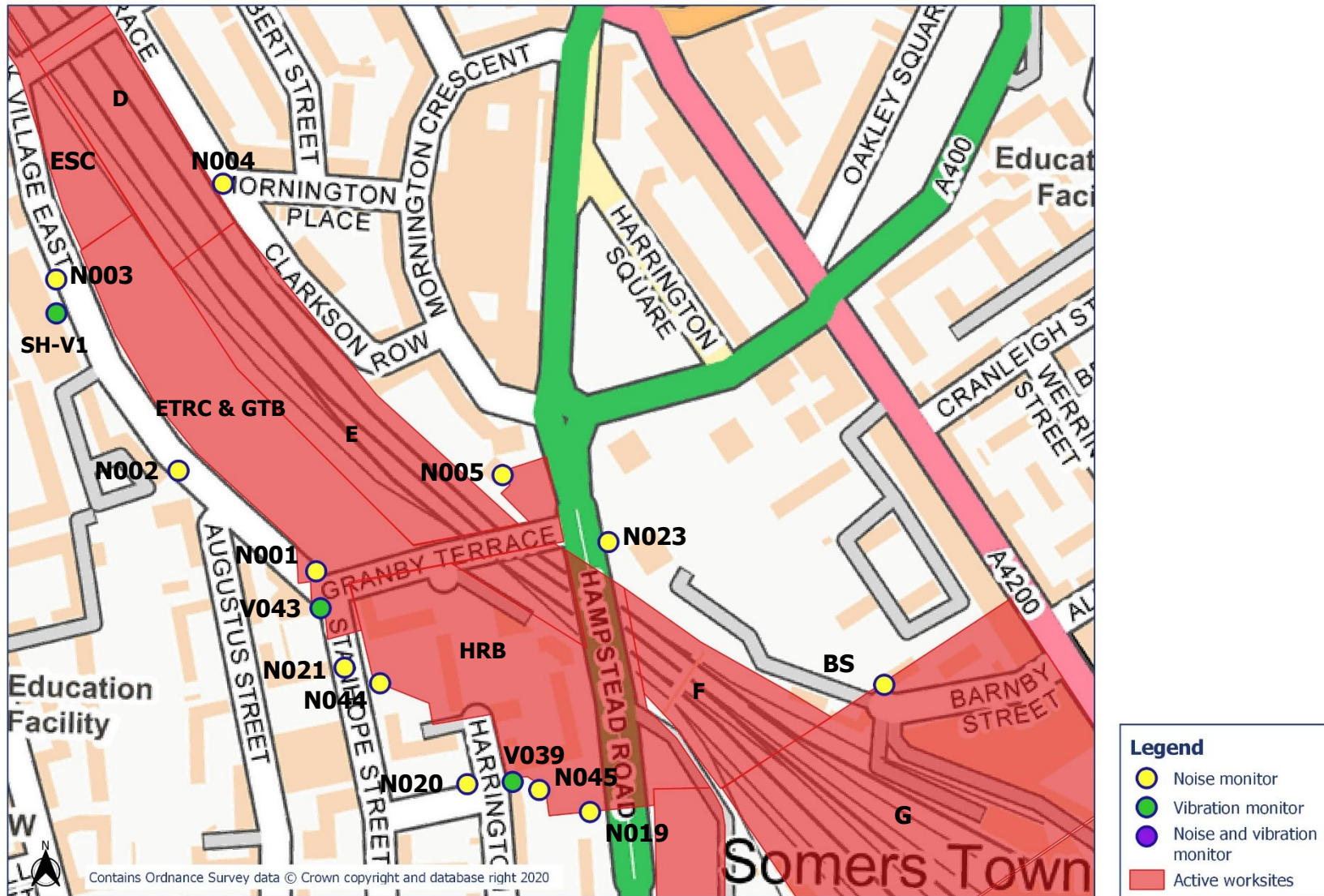


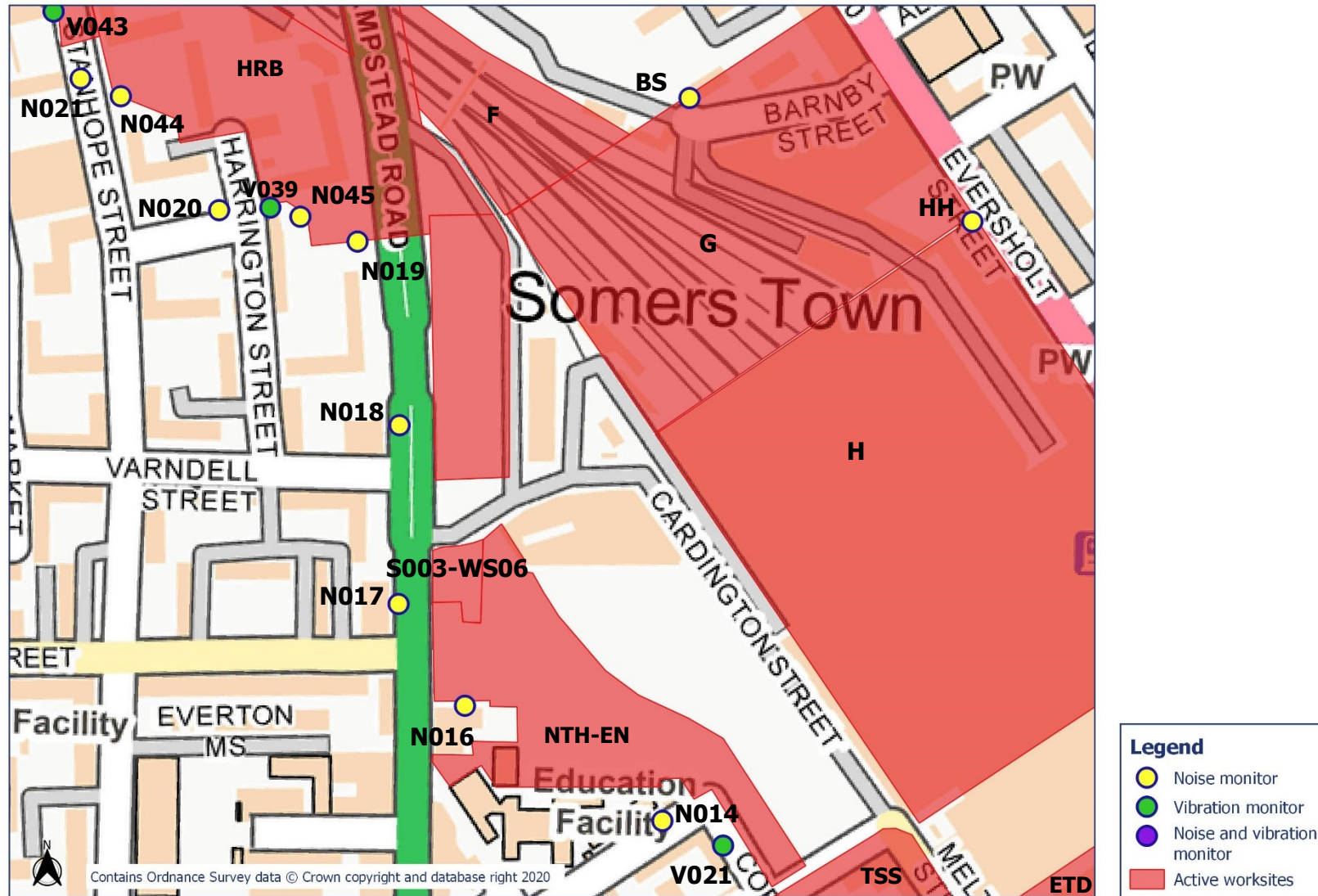




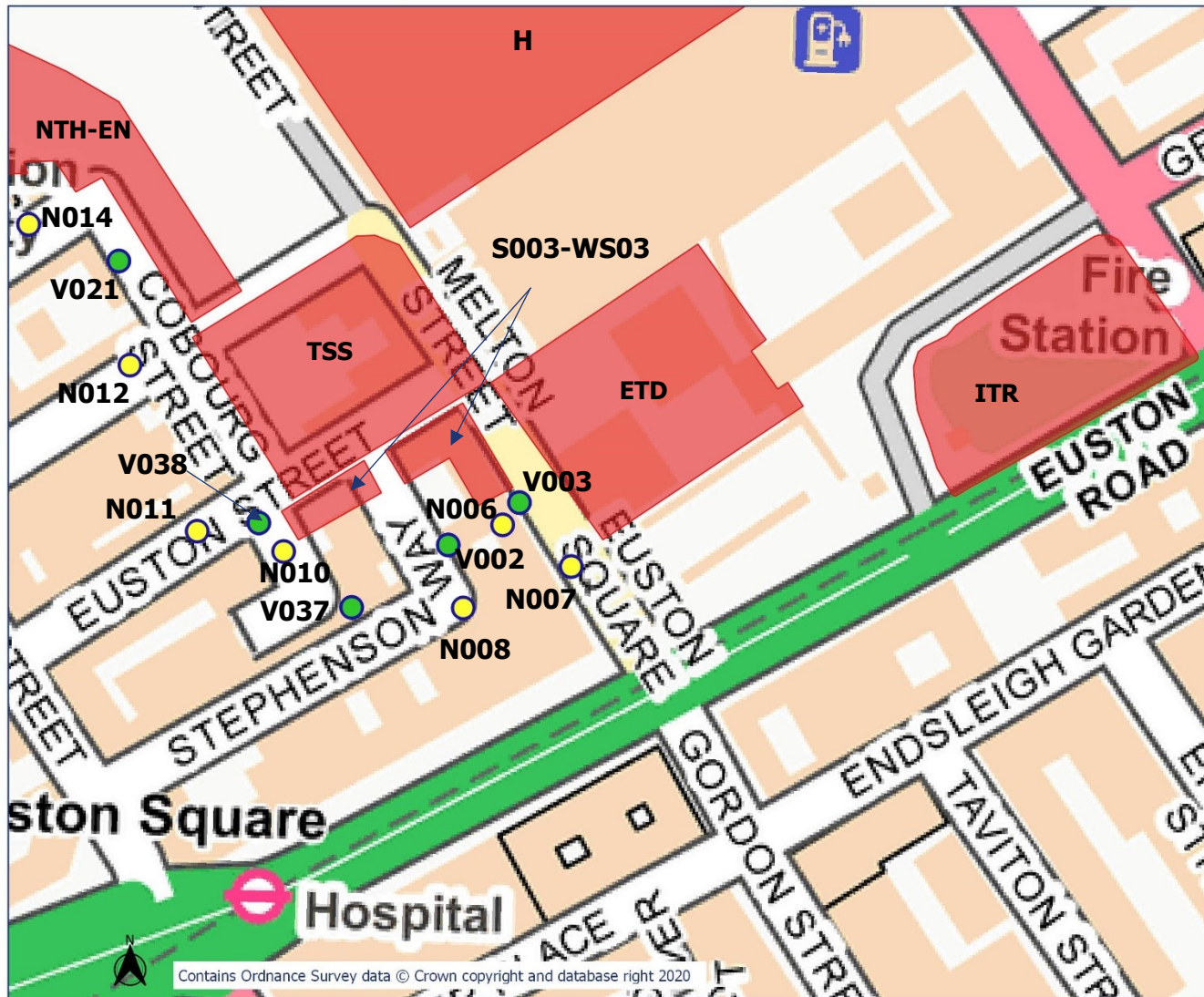
HS2

Noise and vibration monitoring plan - 3





HS2 Noise and vibration monitoring plan - 5

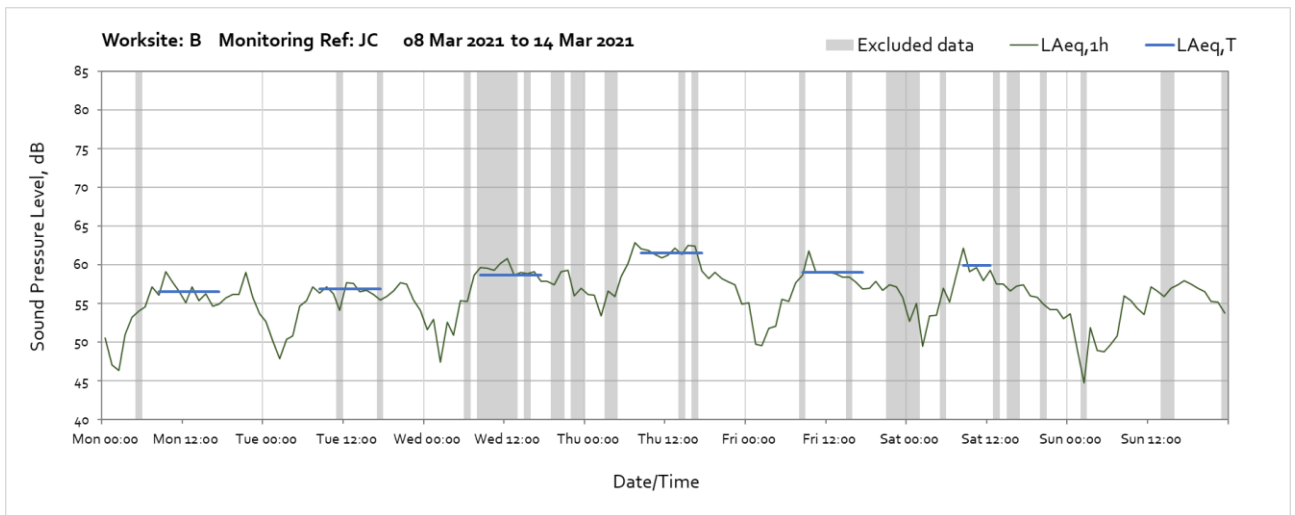
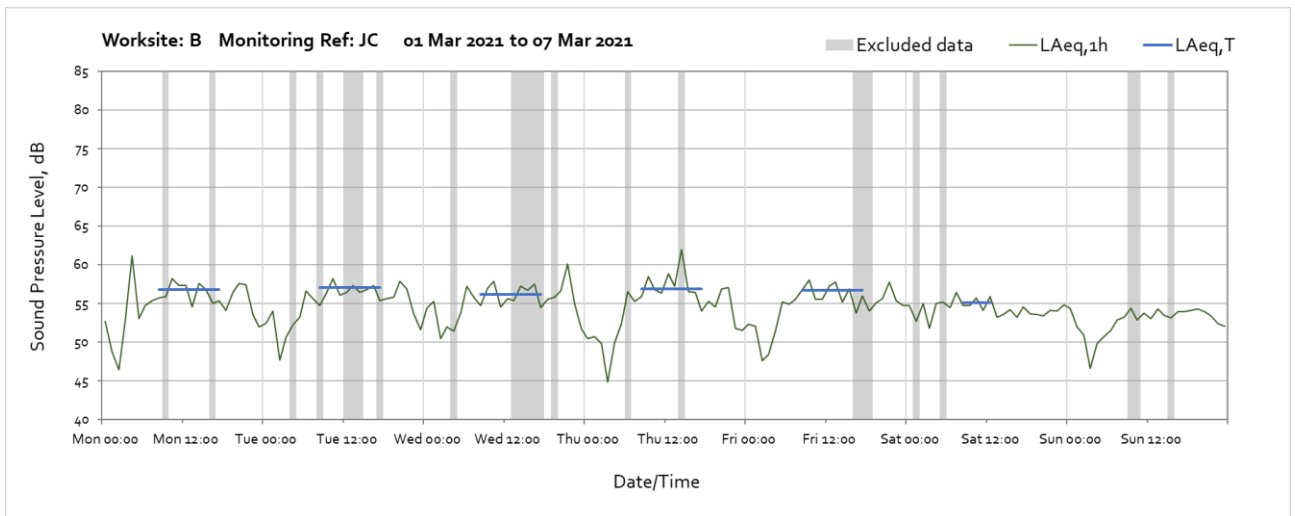


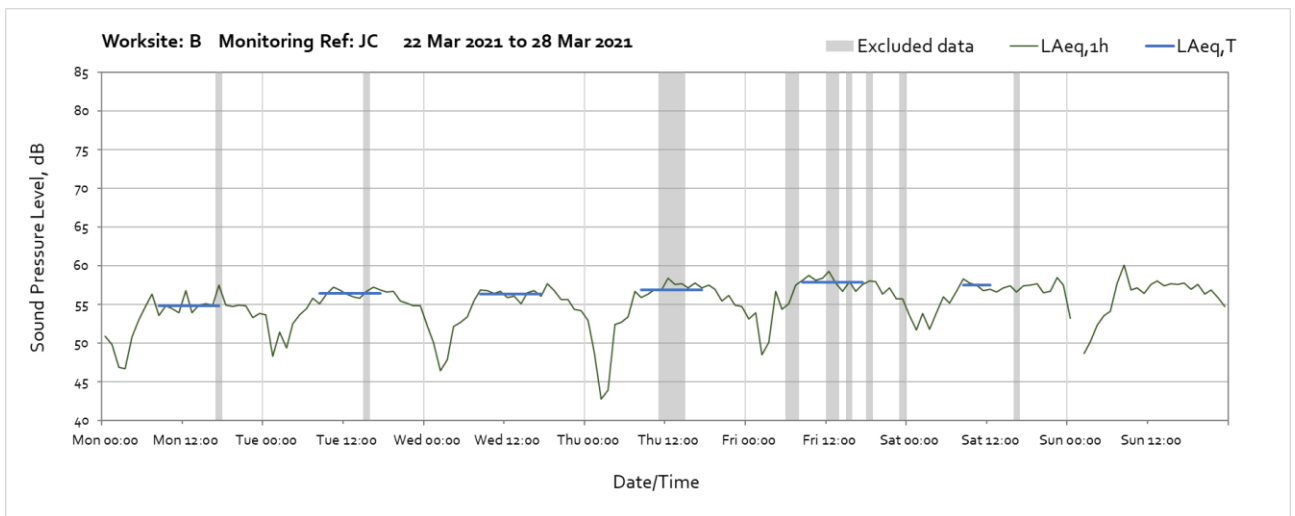
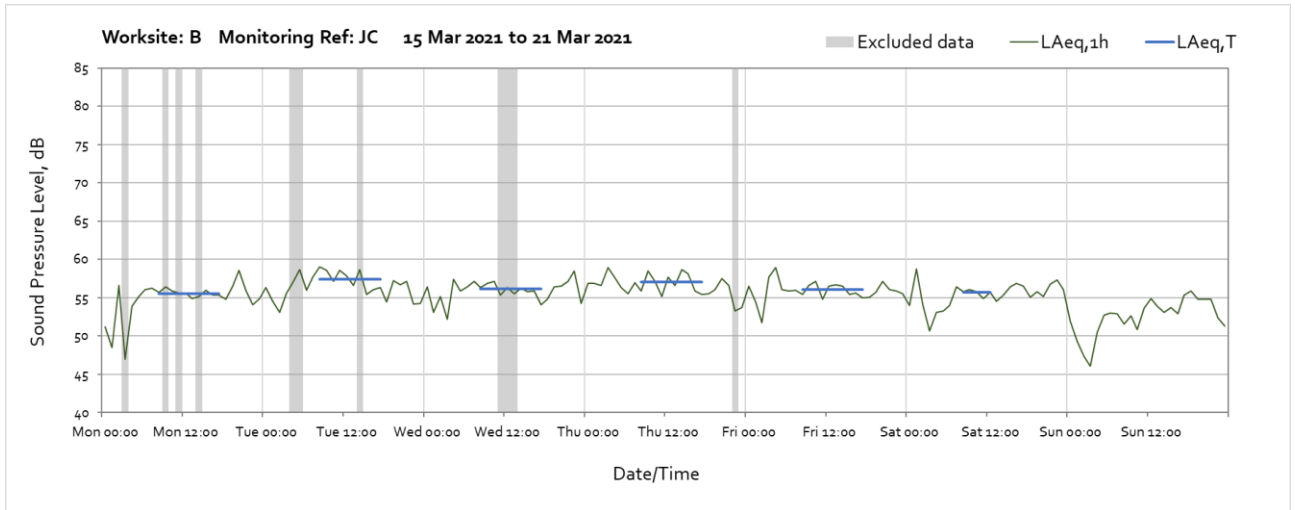
Appendix C Data

The following graphs show the hourly measured ambient noise level $L_{Aeq,1h}$ and, where relevant, the averaged noise level $L_{Aeq,T}$ values, where the time period T is as specified in Table 1 of HS2 Information Paper E23. Periods with adversely weather affected noise levels are greyed out and have been excluded from the calculation of the $L_{Aeq,T}$ values in Table 3 of the main report.

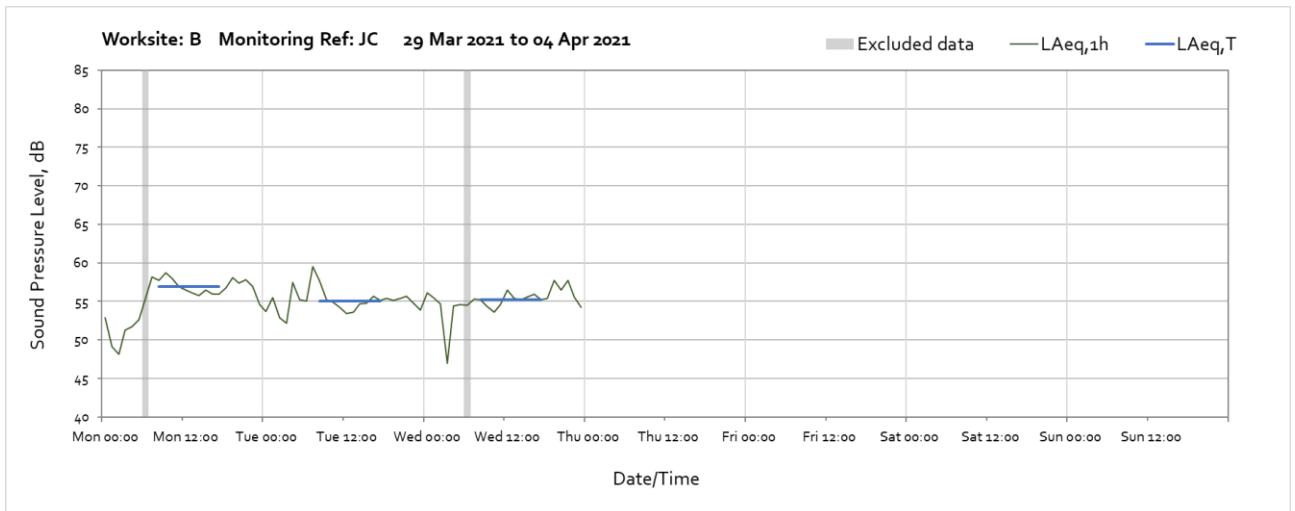
Noise

Worksite: B – Monitoring Ref: JC

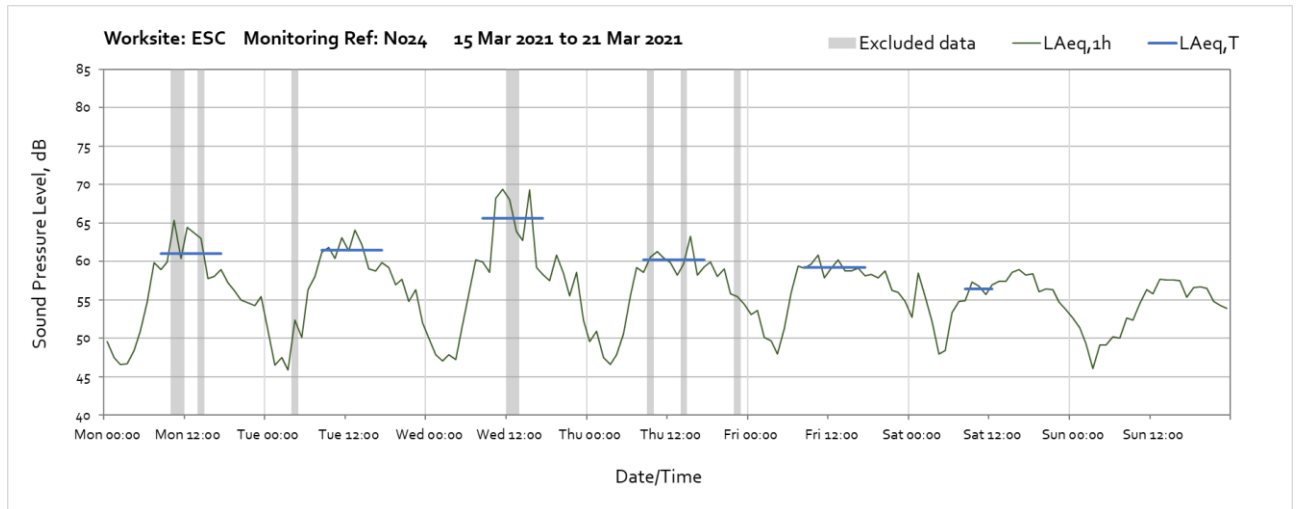
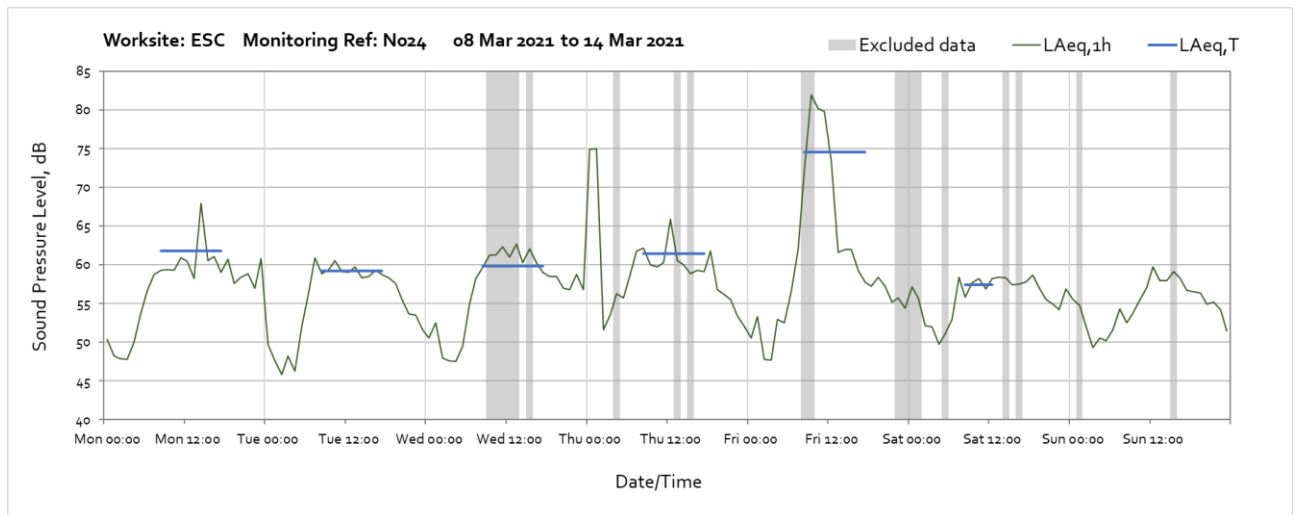
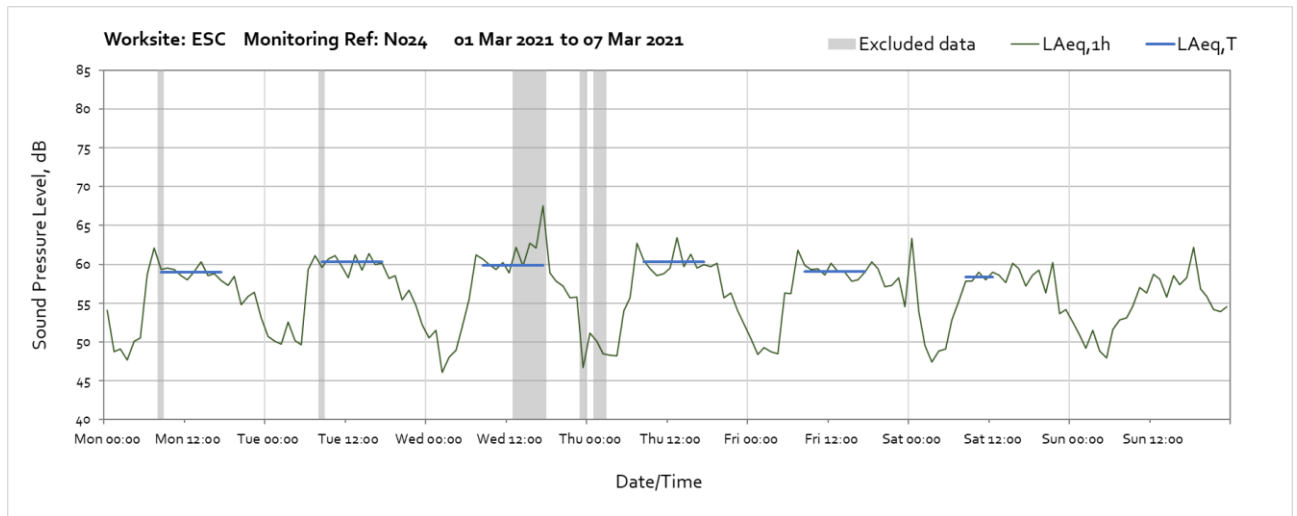




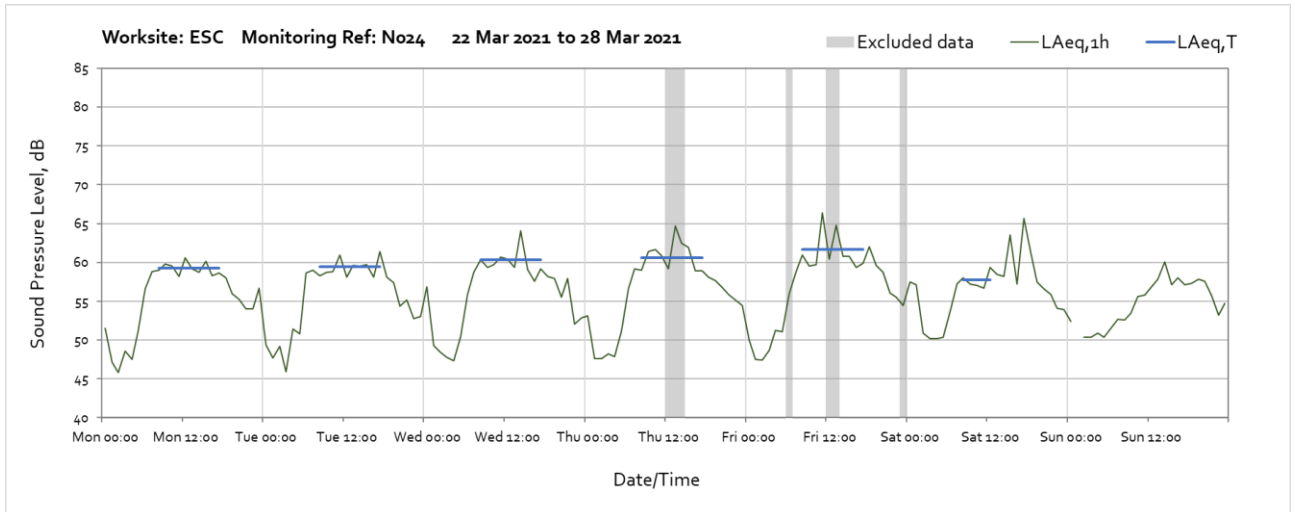
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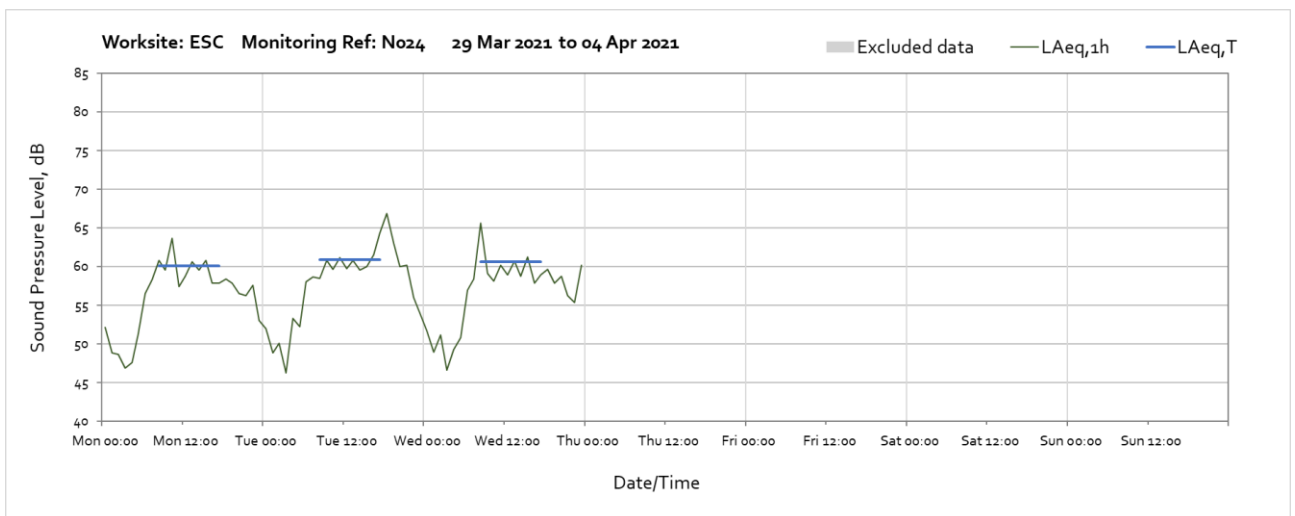
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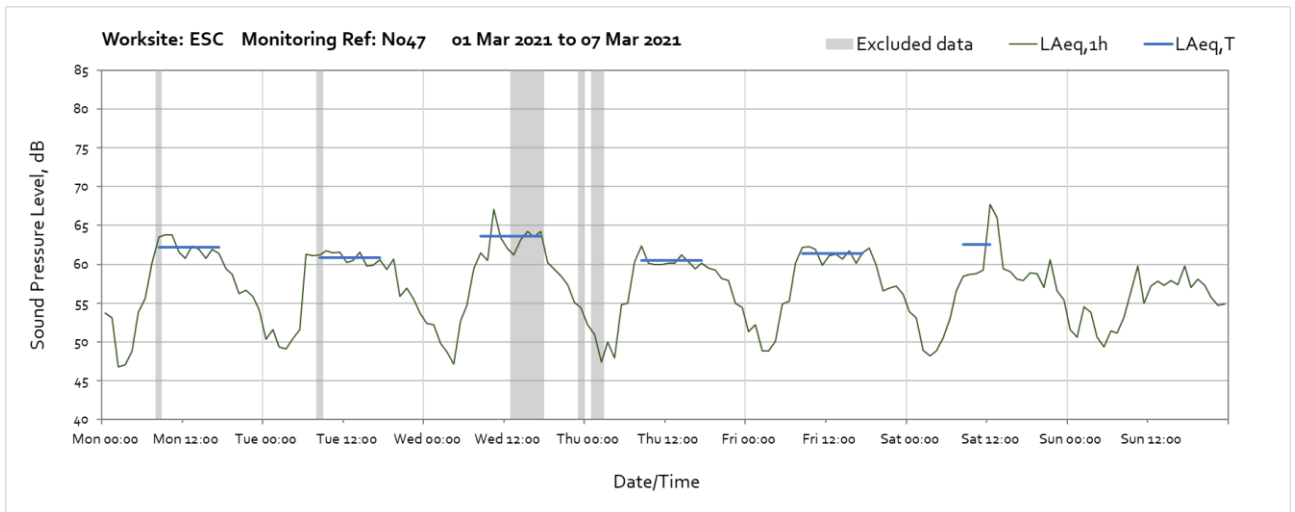
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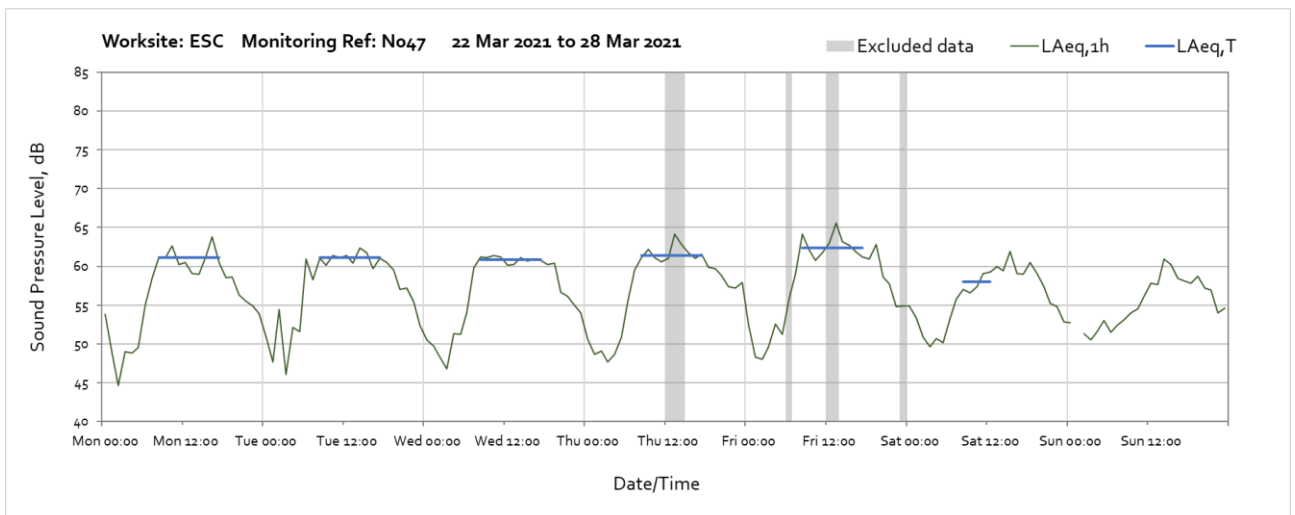
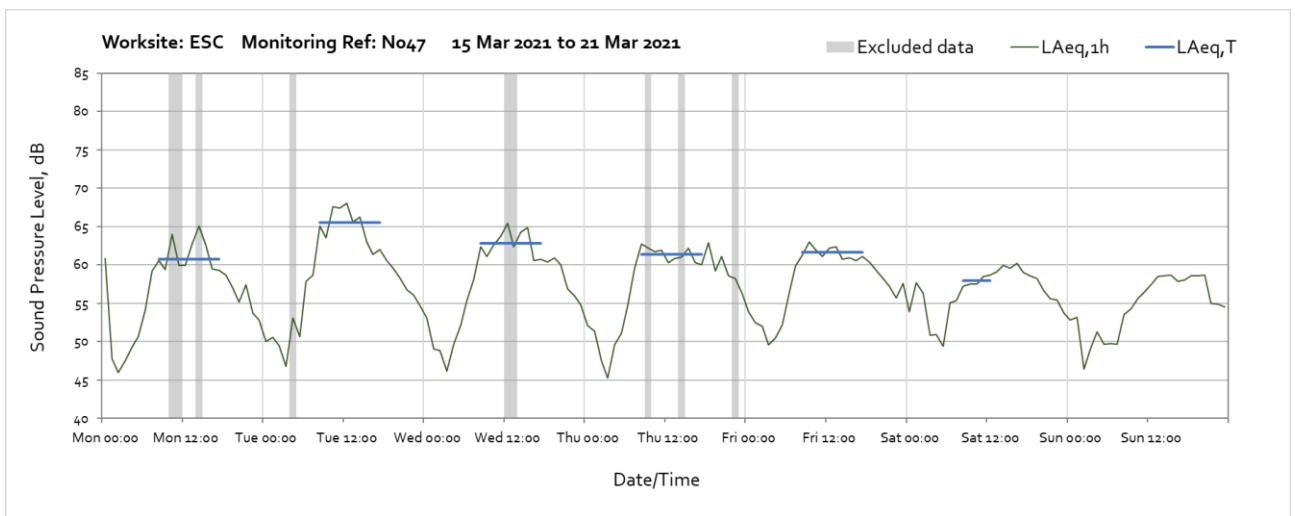
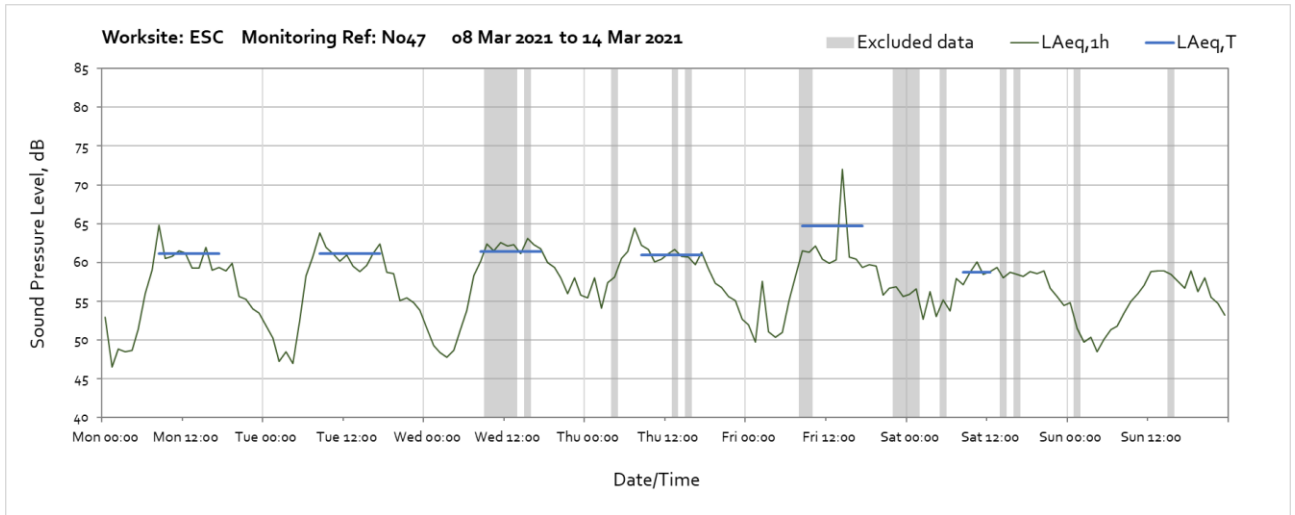


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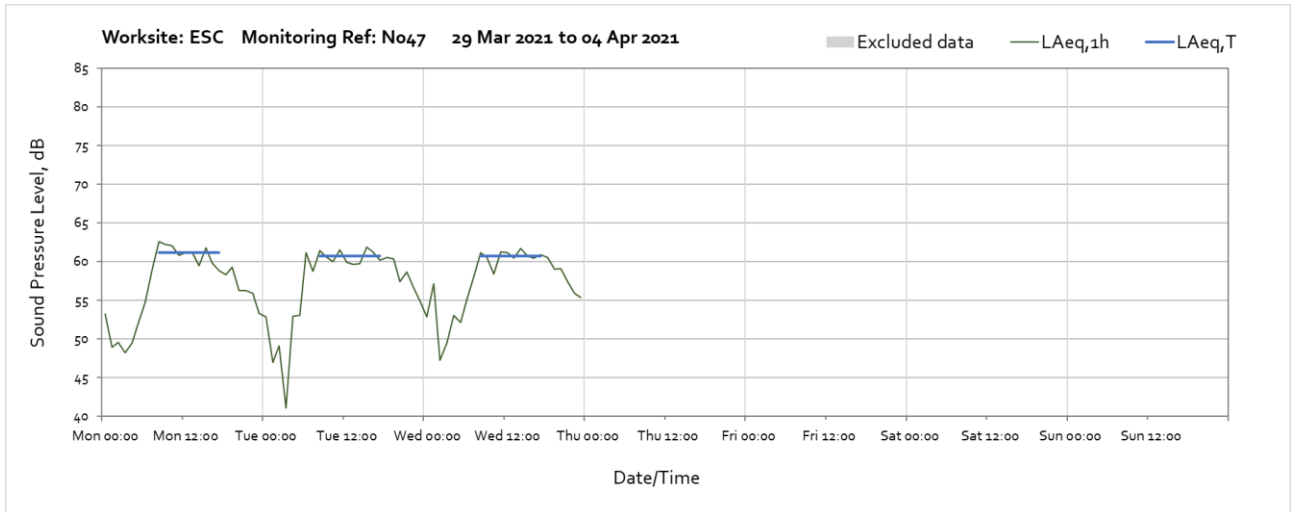


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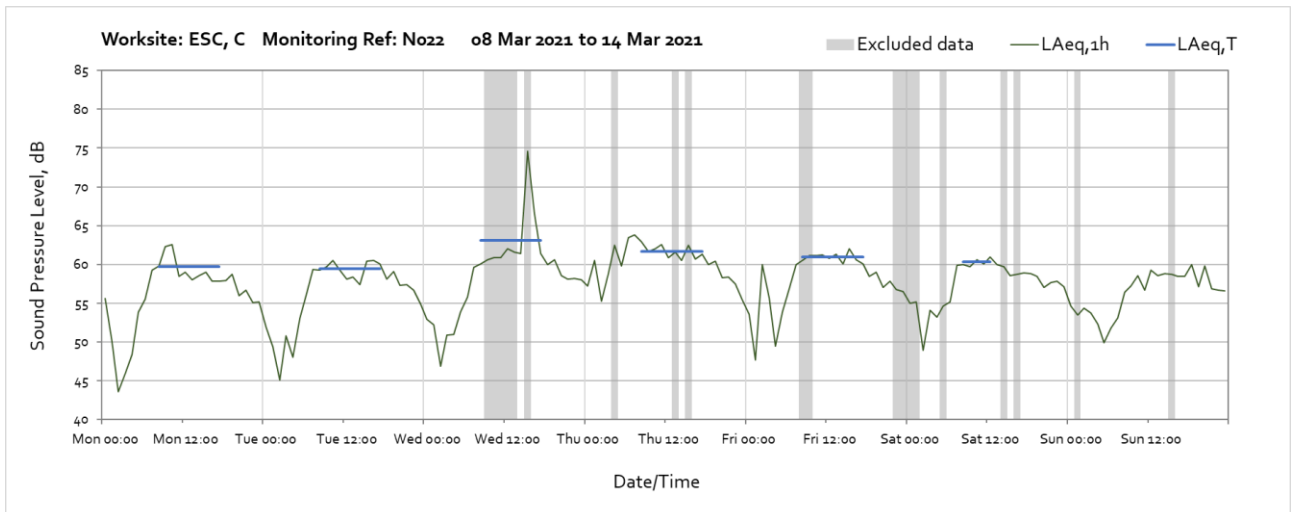
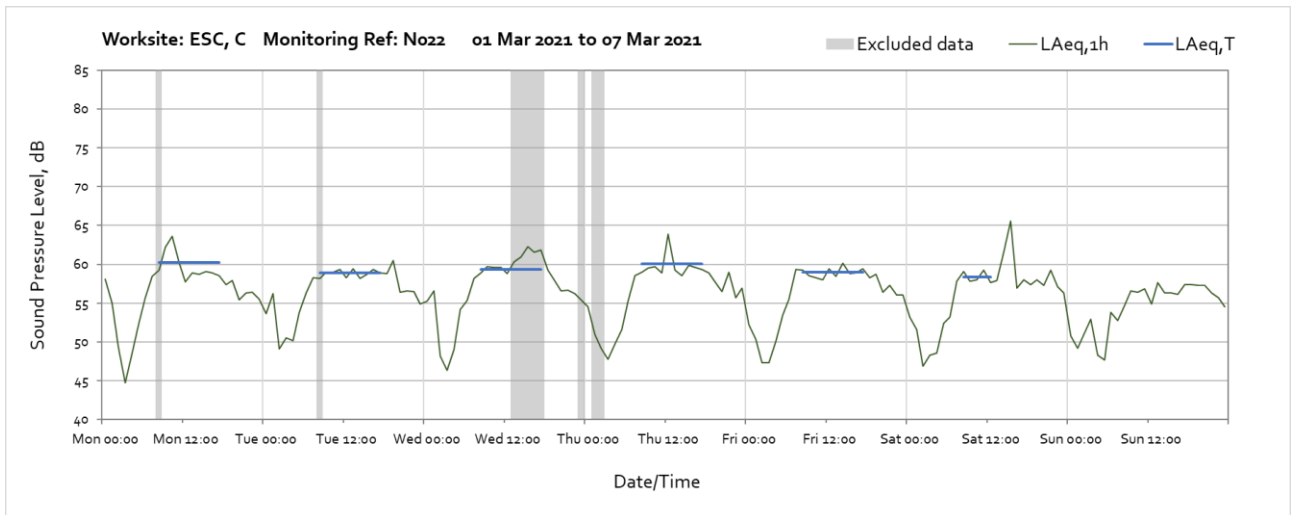


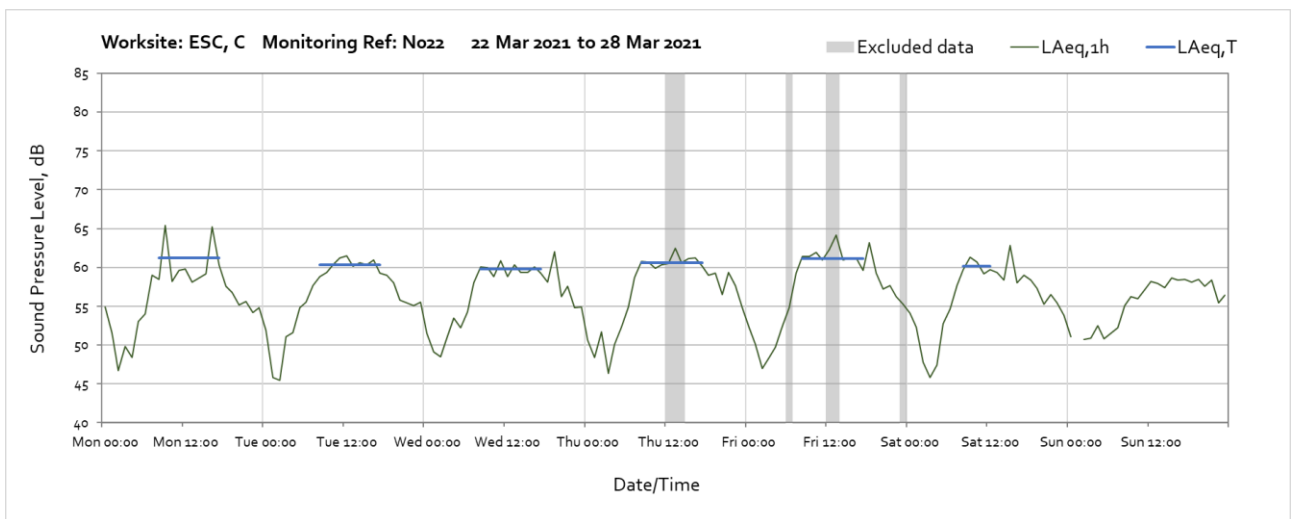
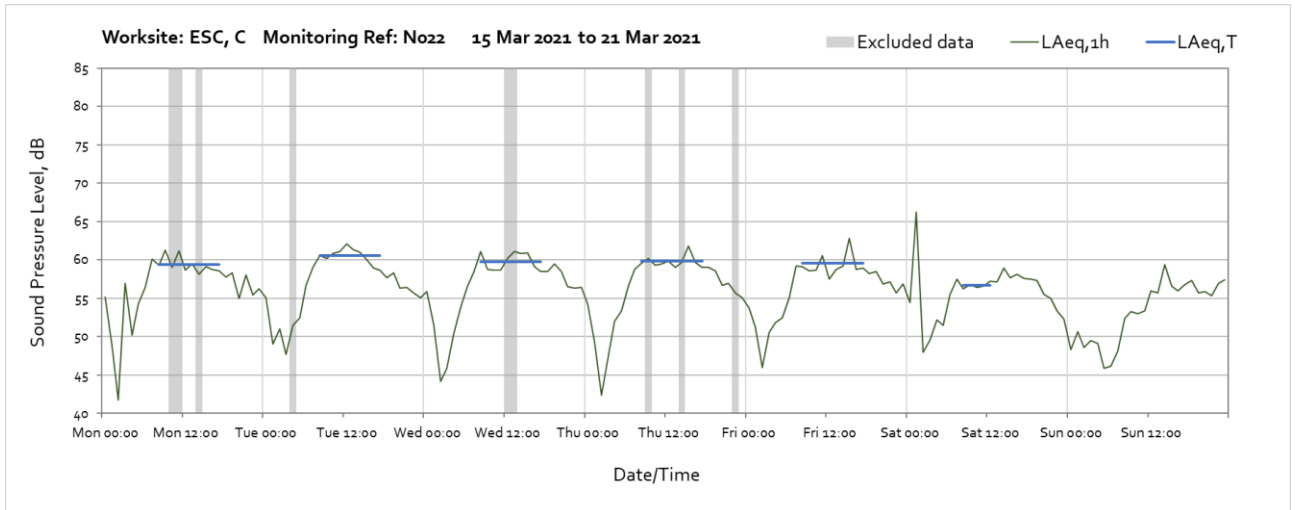


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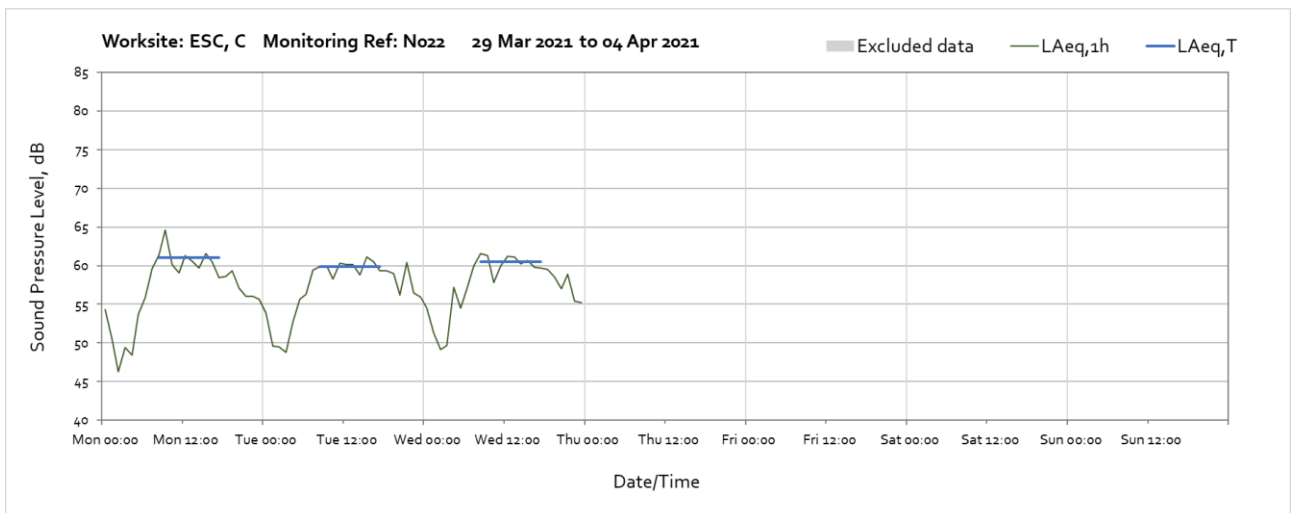


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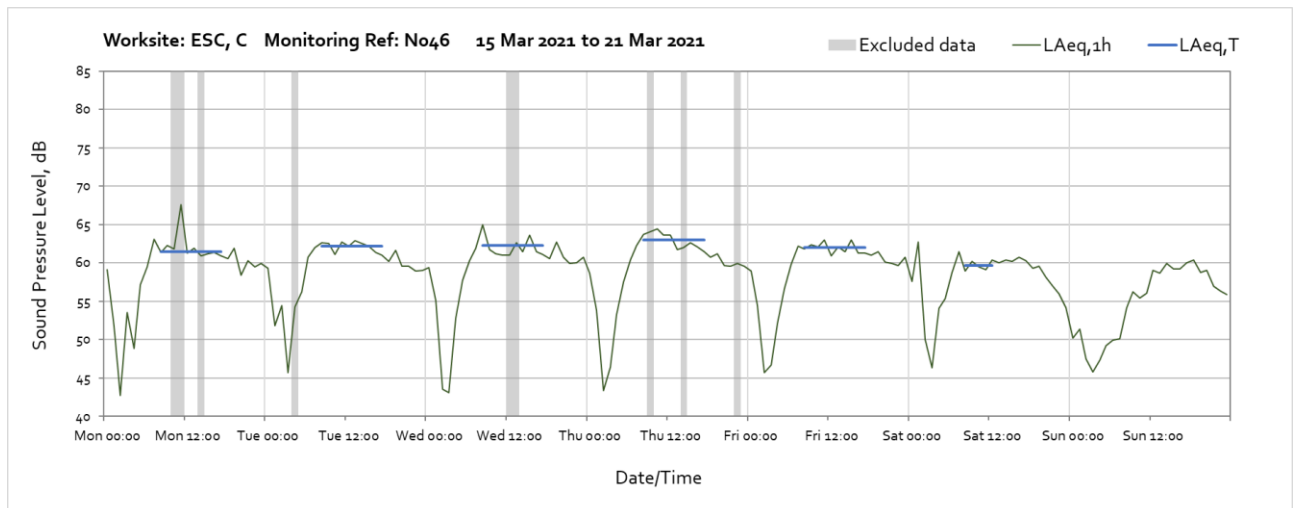
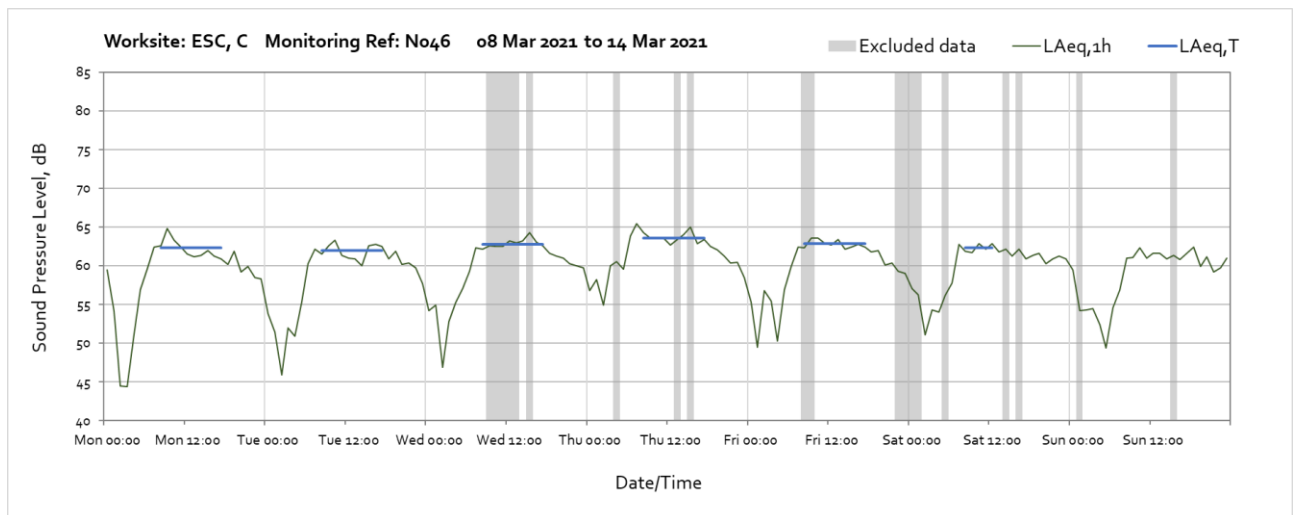
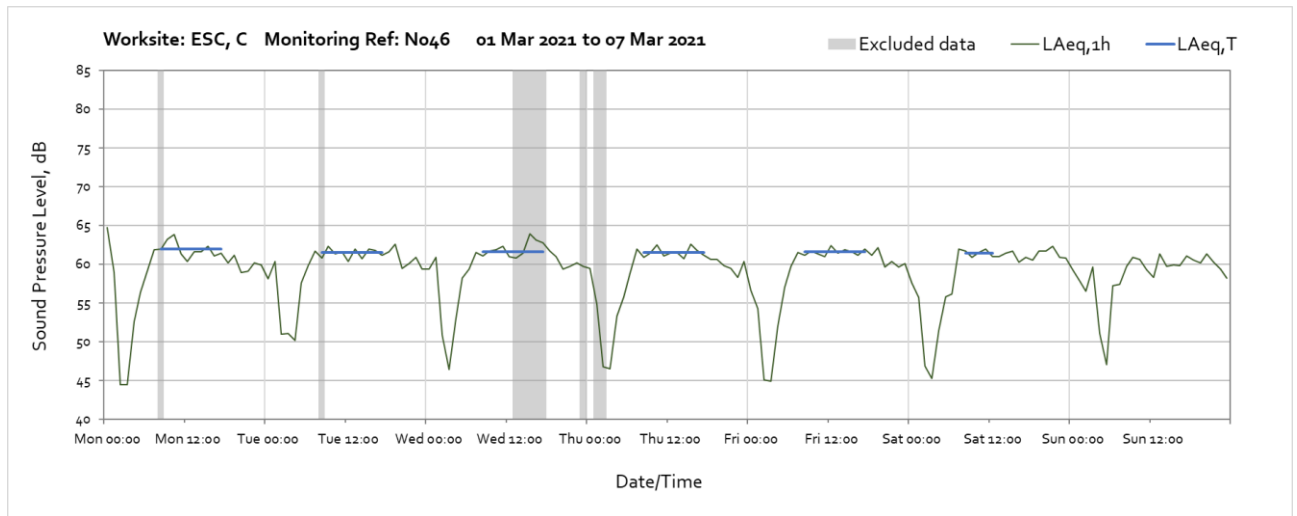




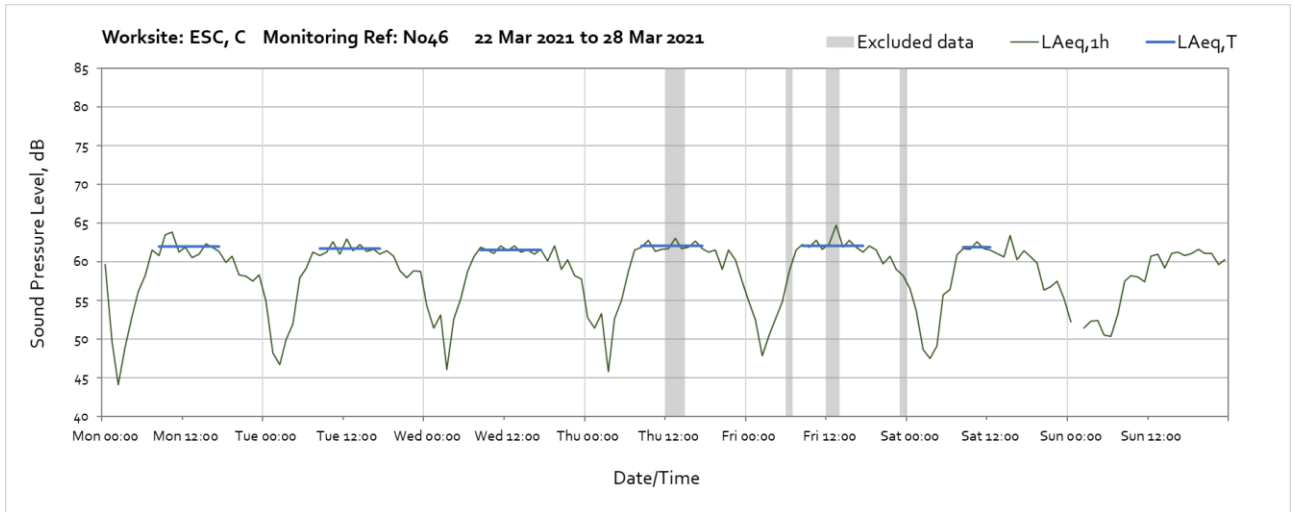
Note: Missing data between 01:00 and 02:00 on Sunday 28th March was due to the clock change (start of BST).



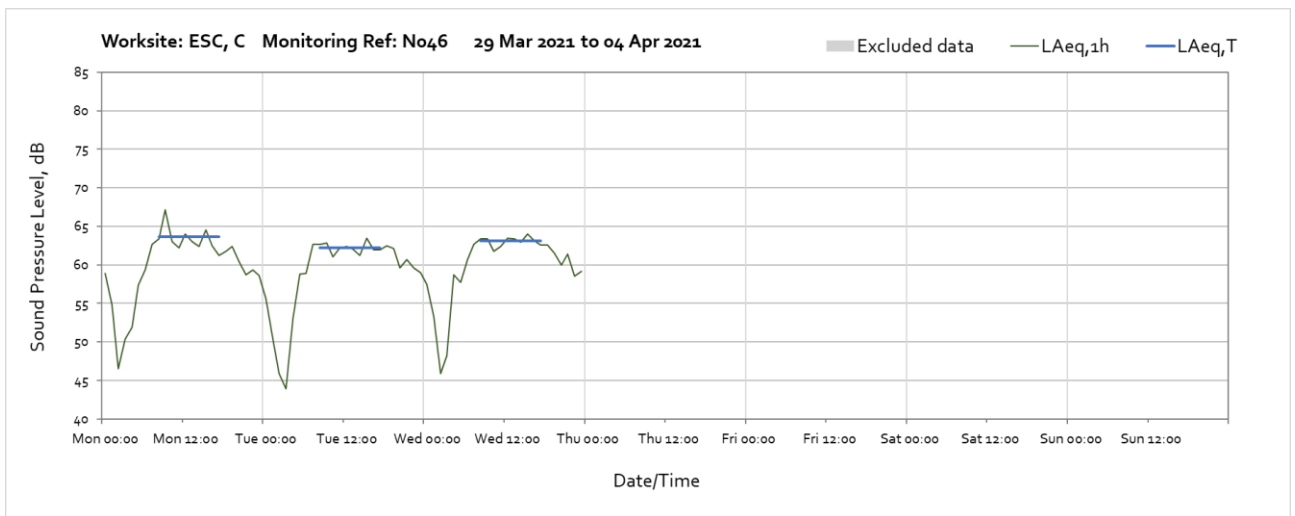
Worksite: ESC, C – Monitoring Ref: N046



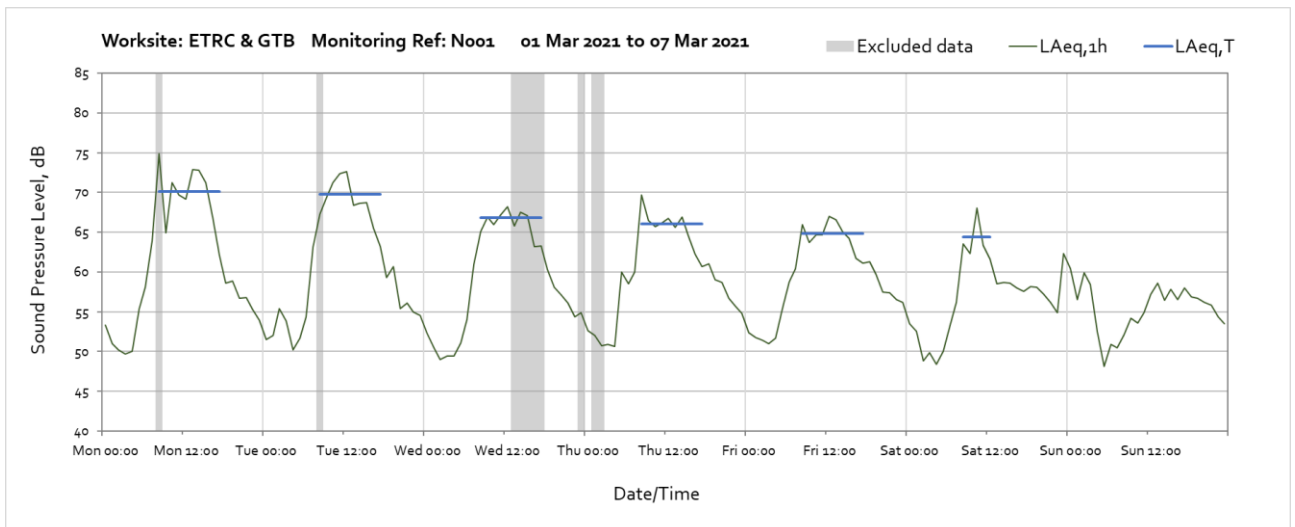
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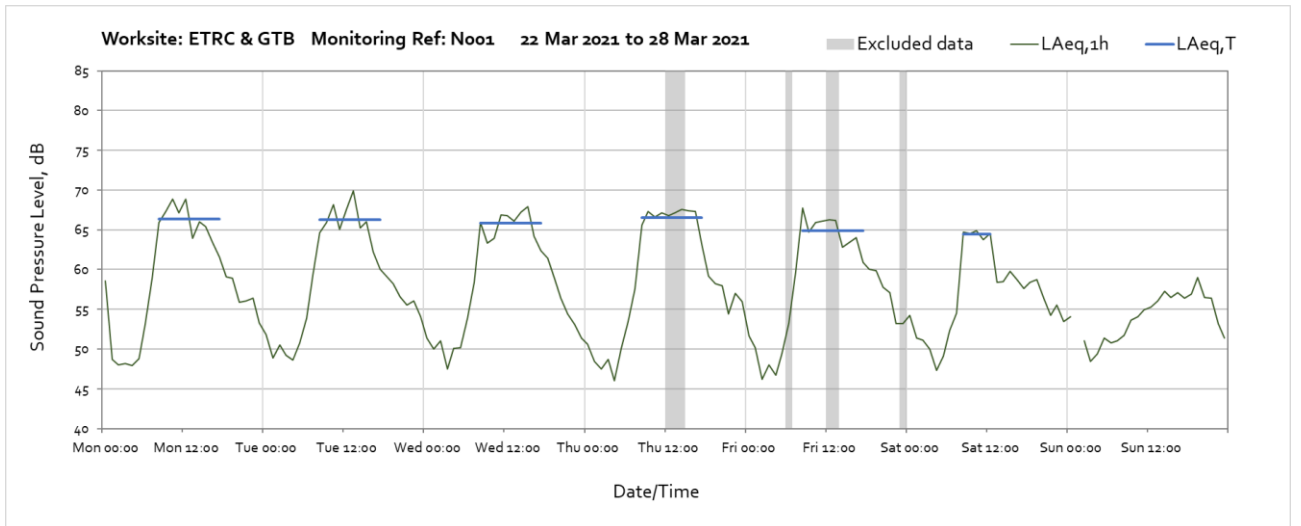
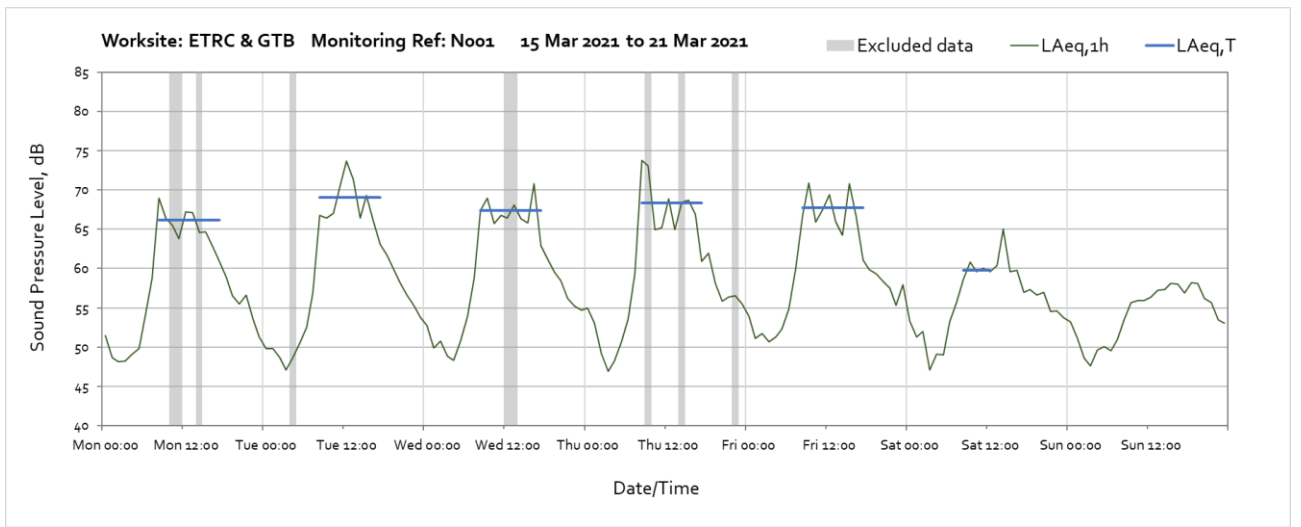
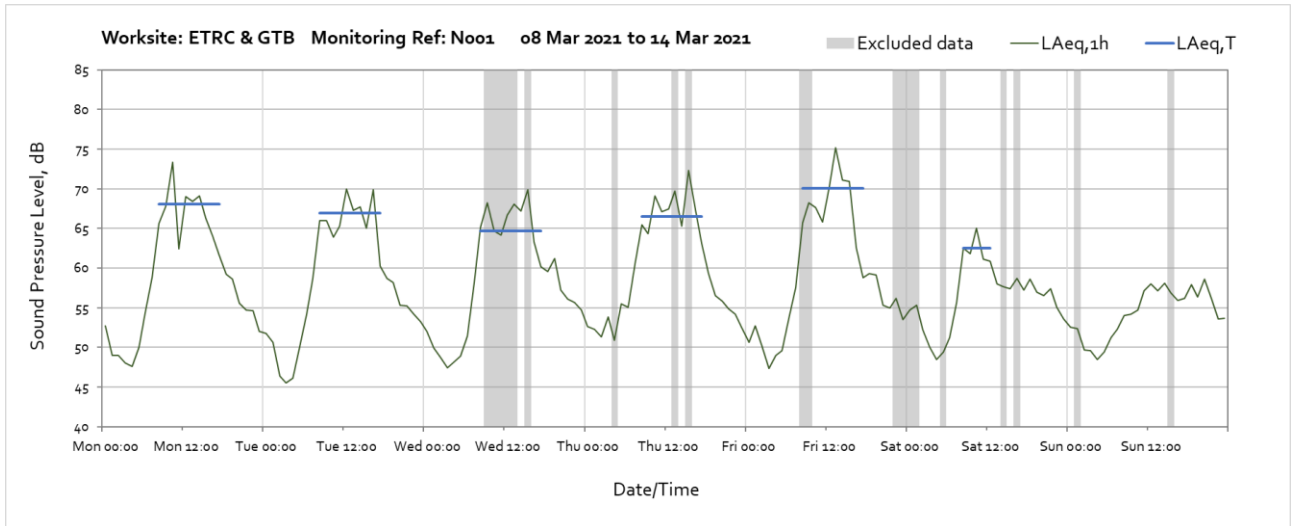


Note: Missing data between 01:00 and 02:00 on Sunday 28th March was due to the clock change (start of BST).

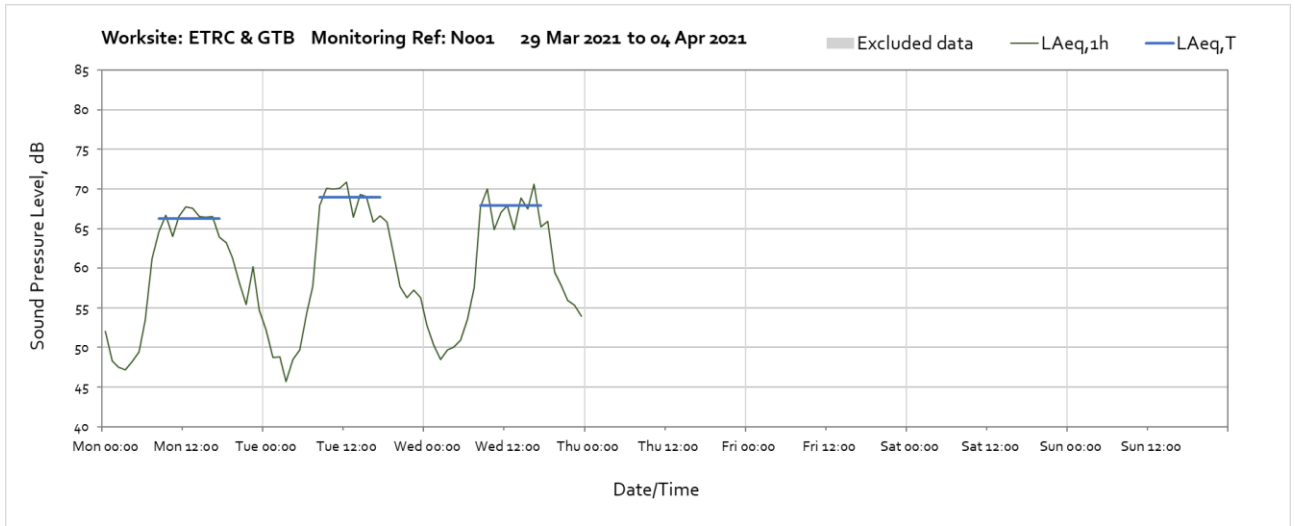


Worksite: ETRC & GTB – Monitoring Ref: N001

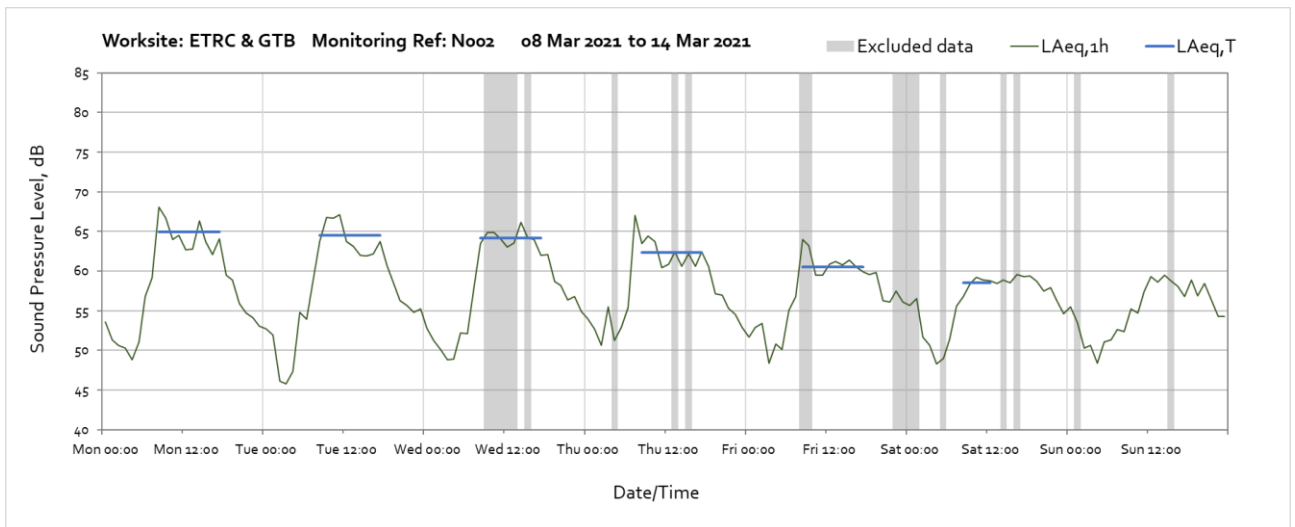
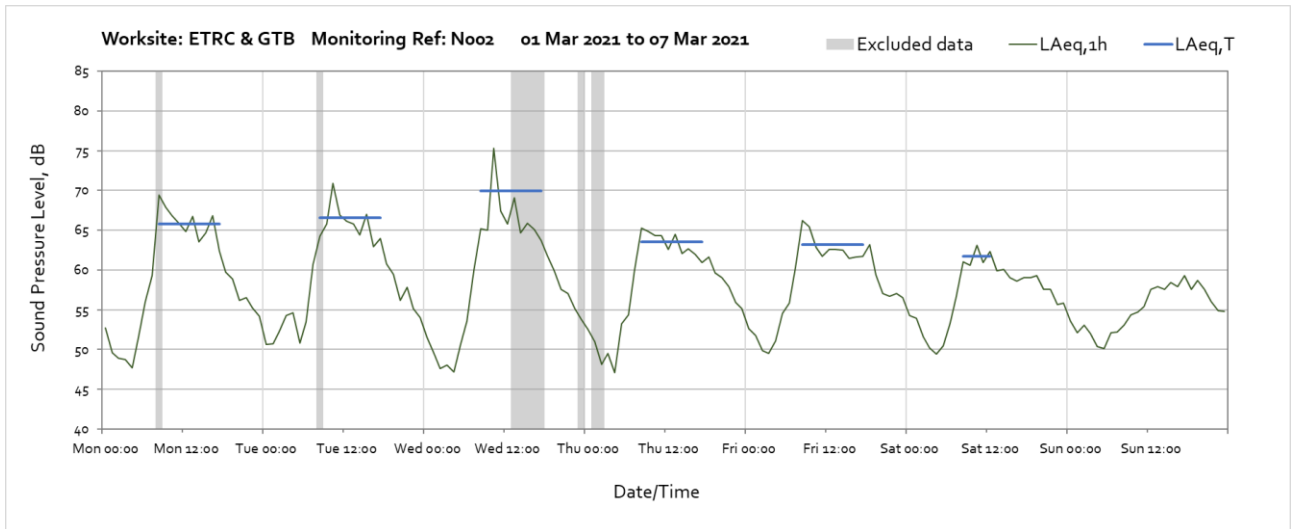


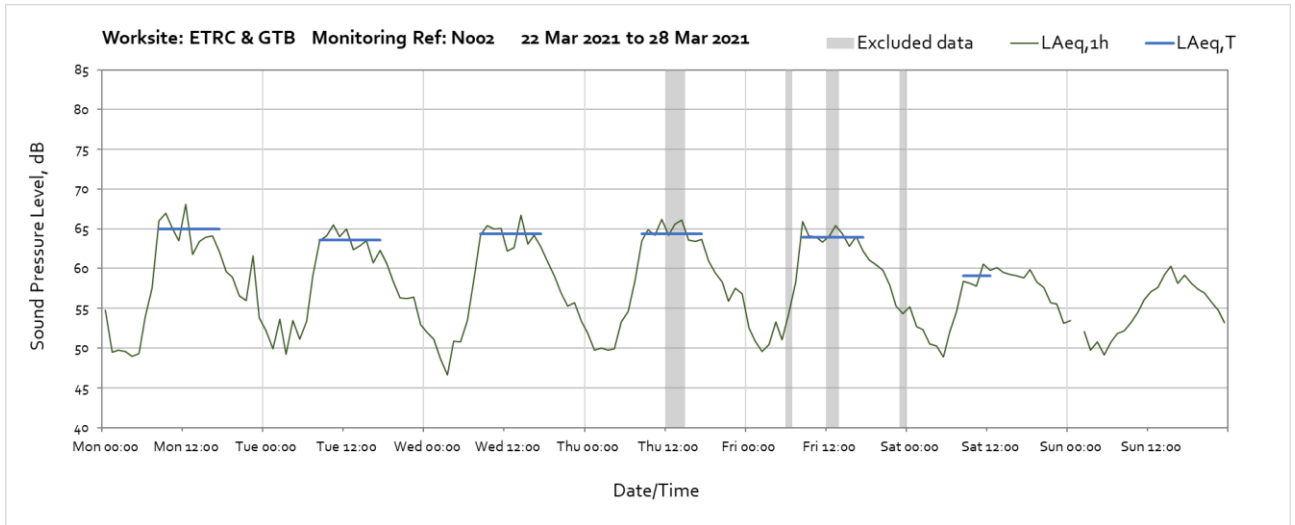
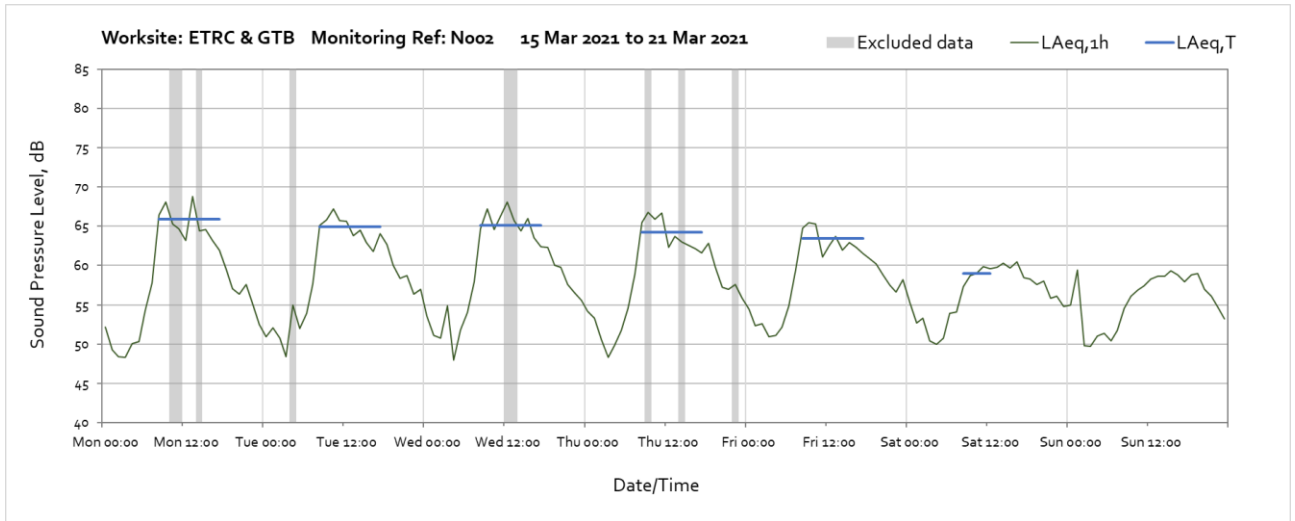


Note: Missing data between 01:00 and 02:00 on Sunday 28th March was due to the clock change (start of BST).

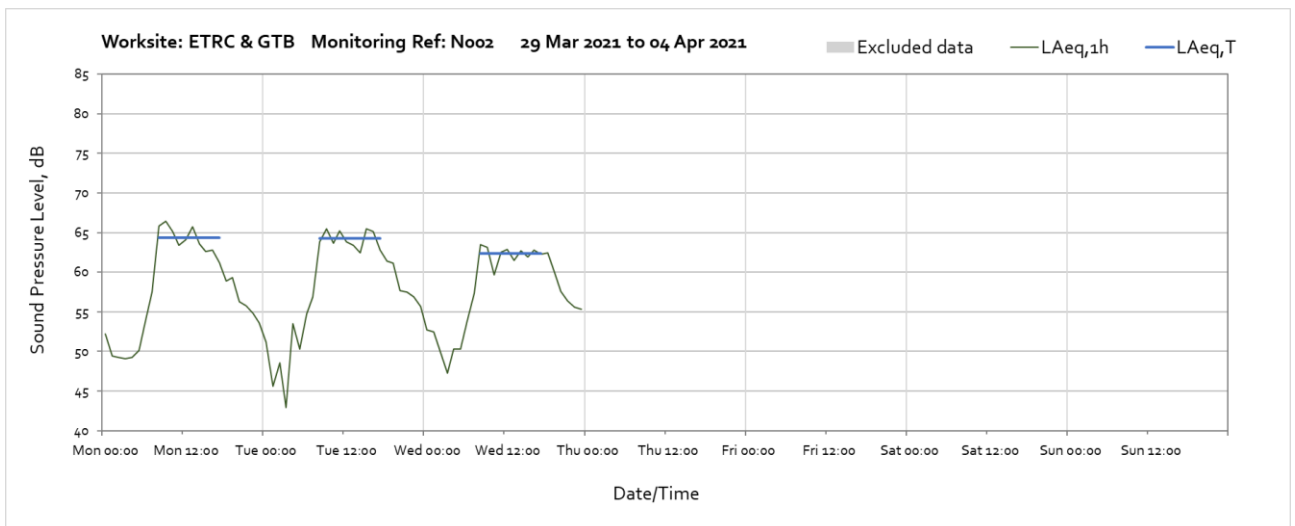


Worksite: ETRC & GTB – Monitoring Ref: N002

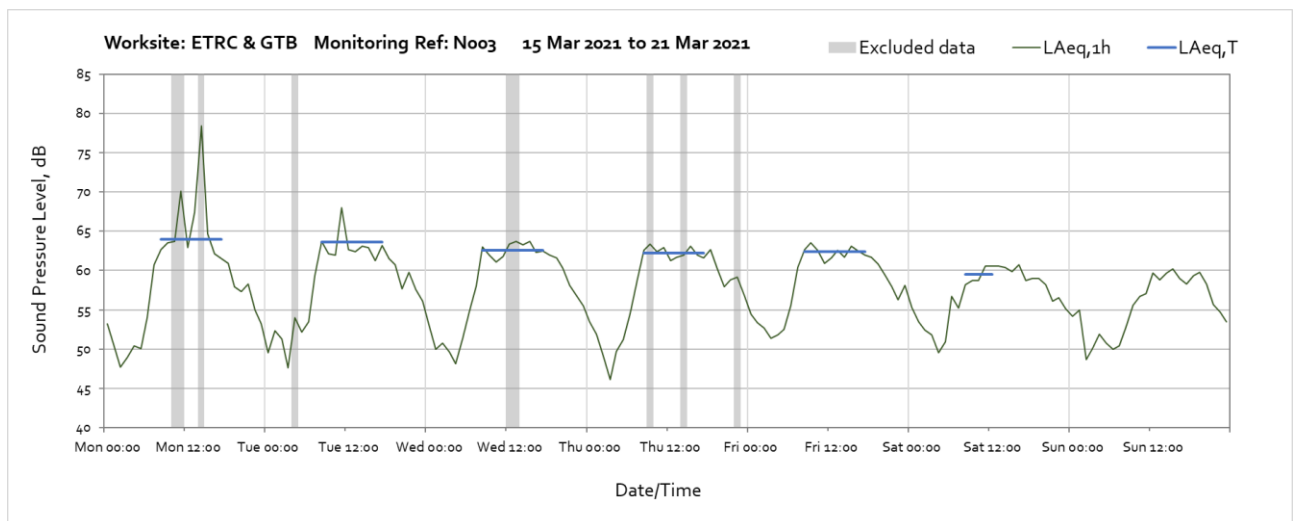
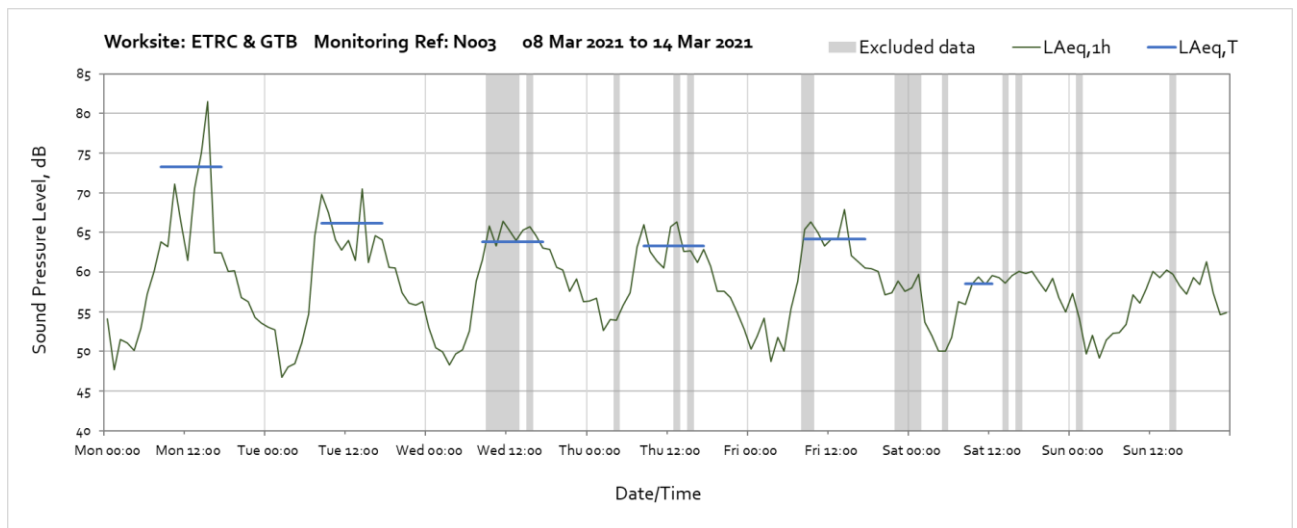
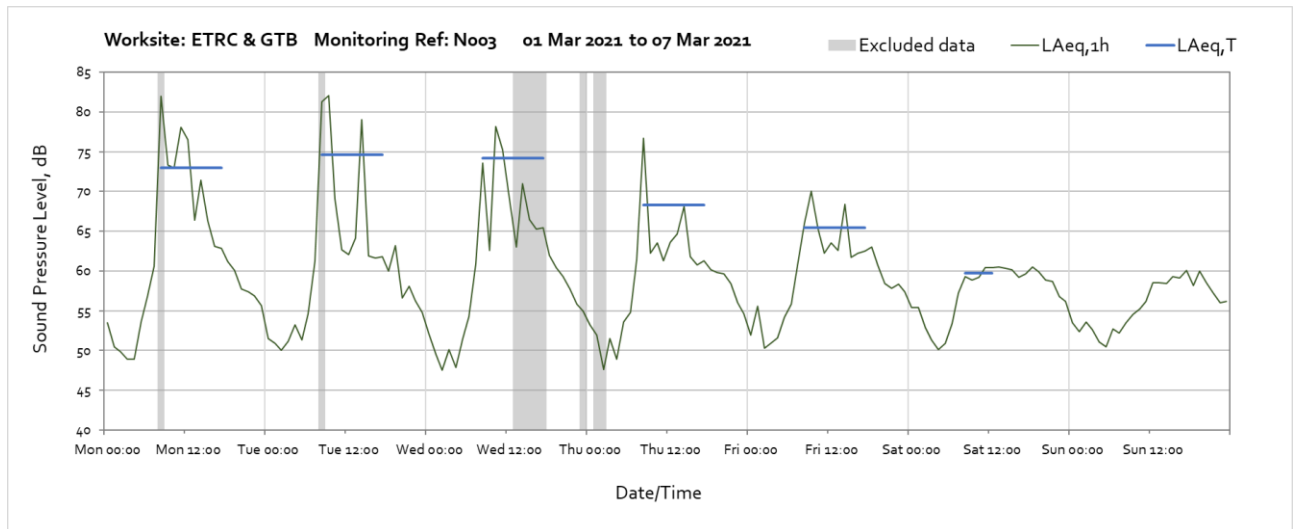


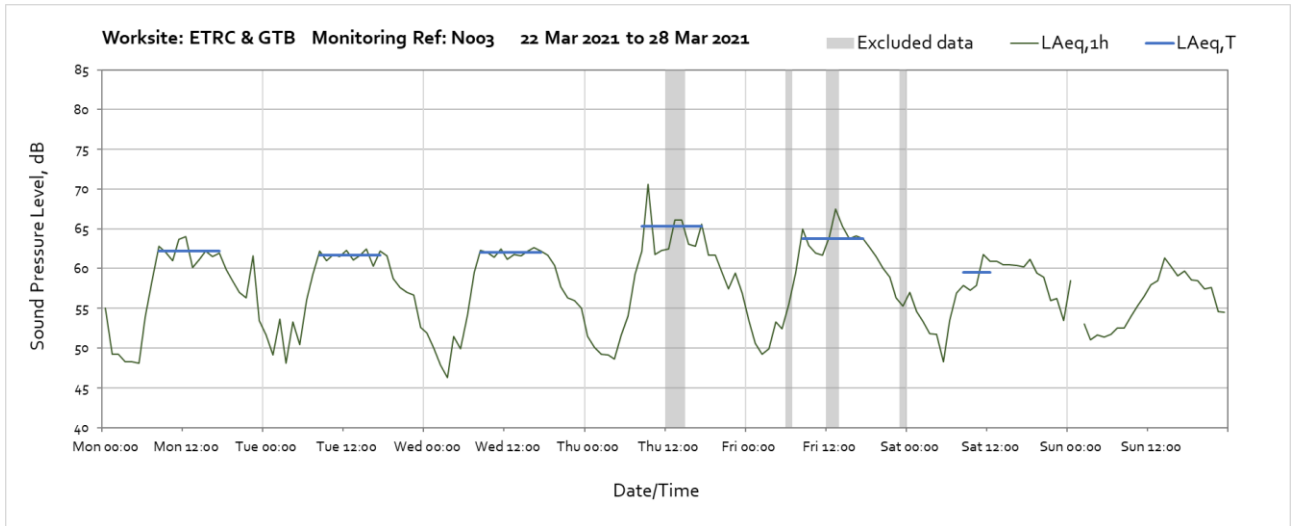


Note: Missing data between 01:00 and 02:00 on Sunday 28th March was due to the clock change (start of BST).

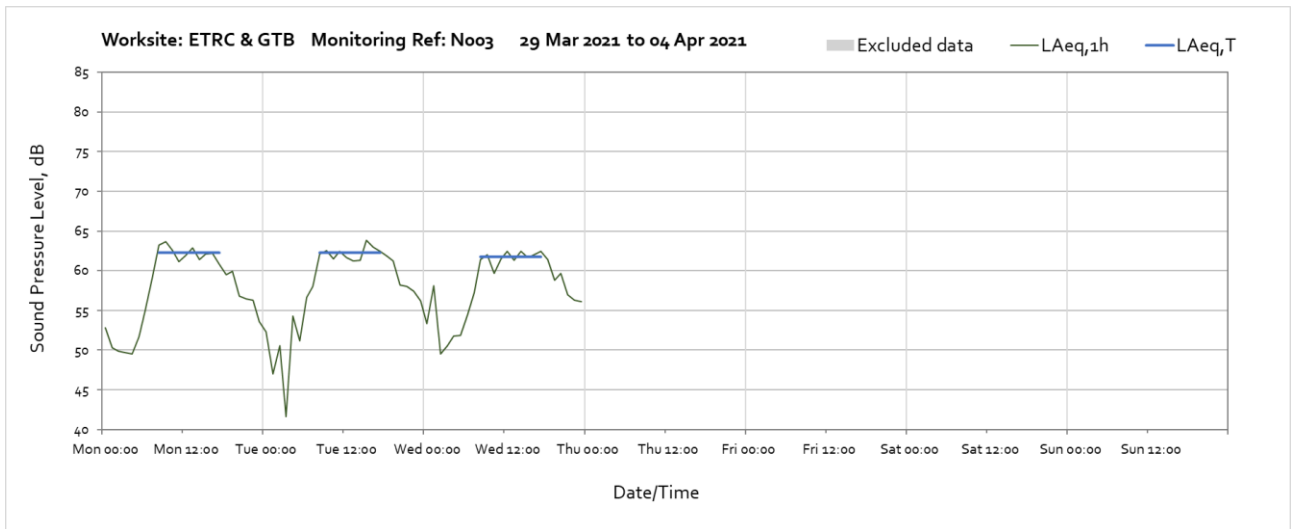


Worksite: ETRC & GTB – Monitoring Ref: N003

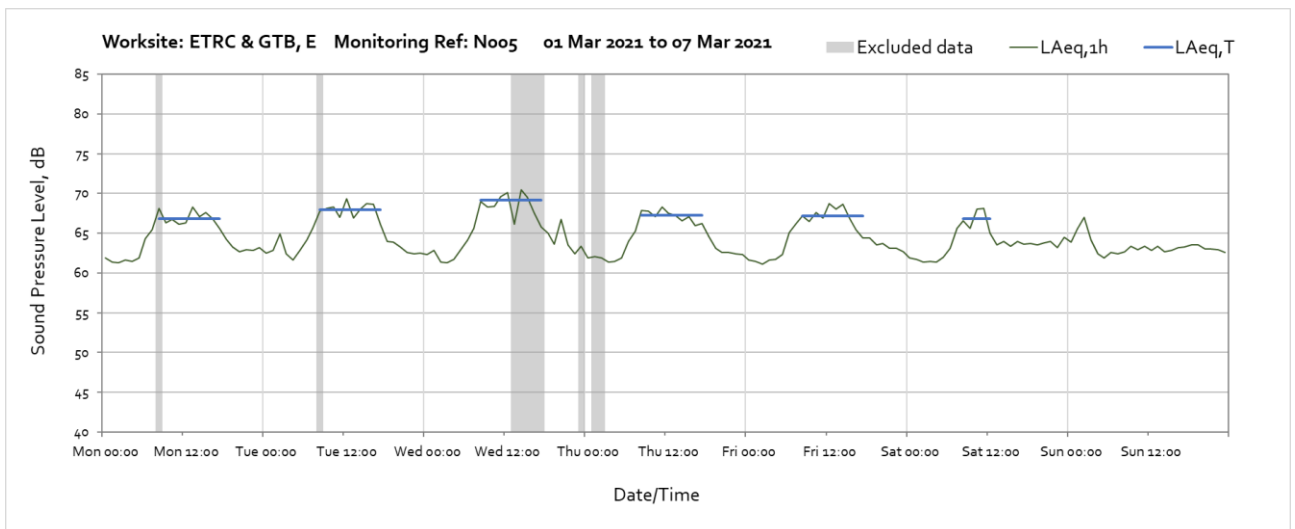


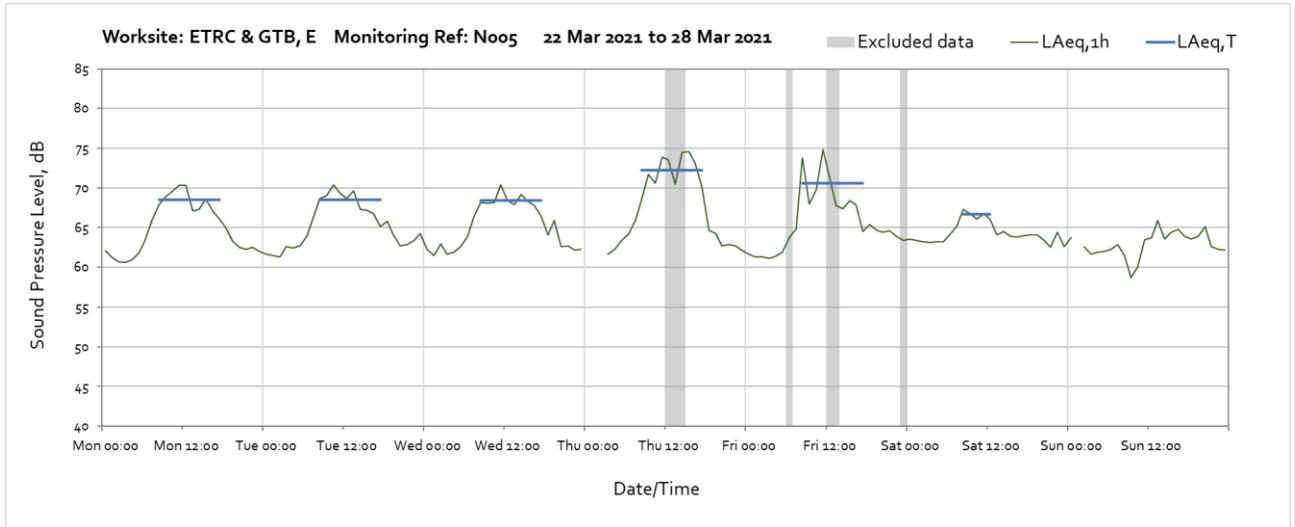
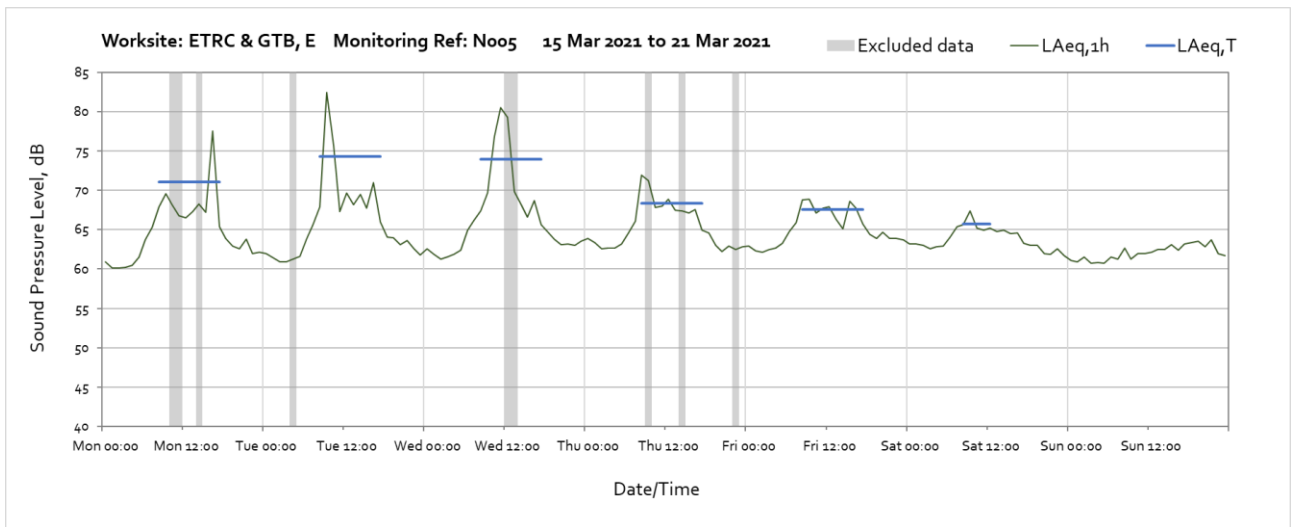
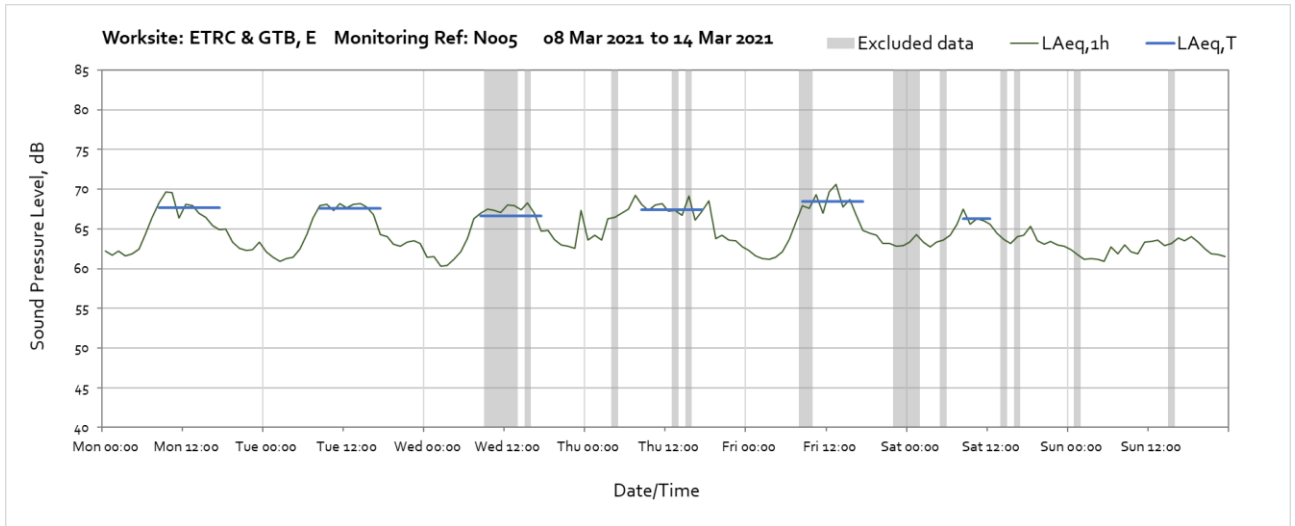


Note: Missing data between 01:00 and 02:00 on Sunday 28th March was due to the clock change (start of BST).



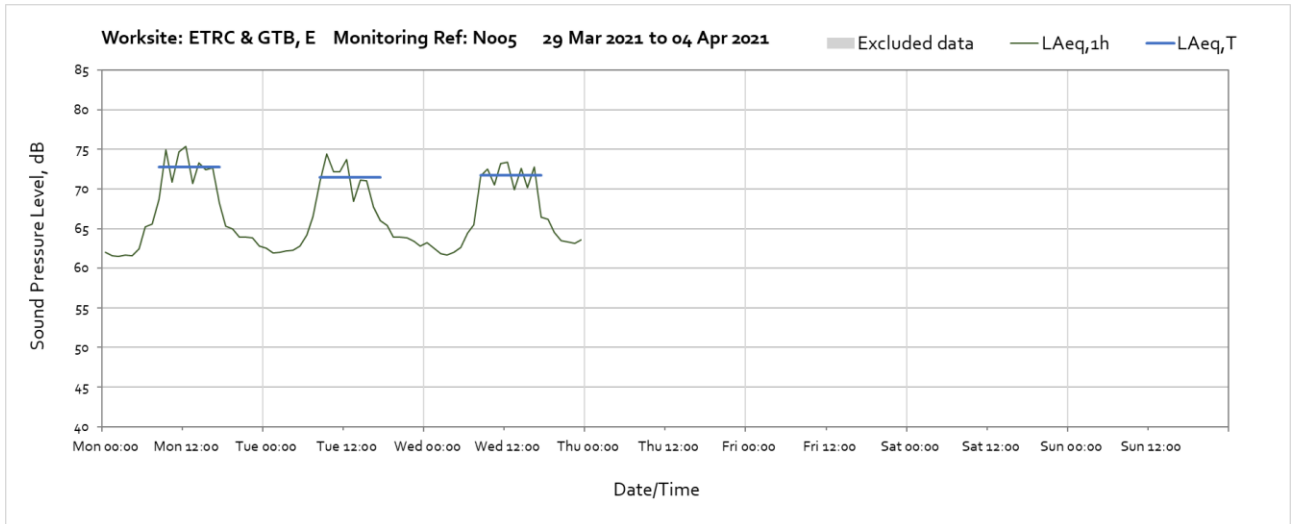
Worksite: ETRC & GTB, E – Monitoring Ref: N005



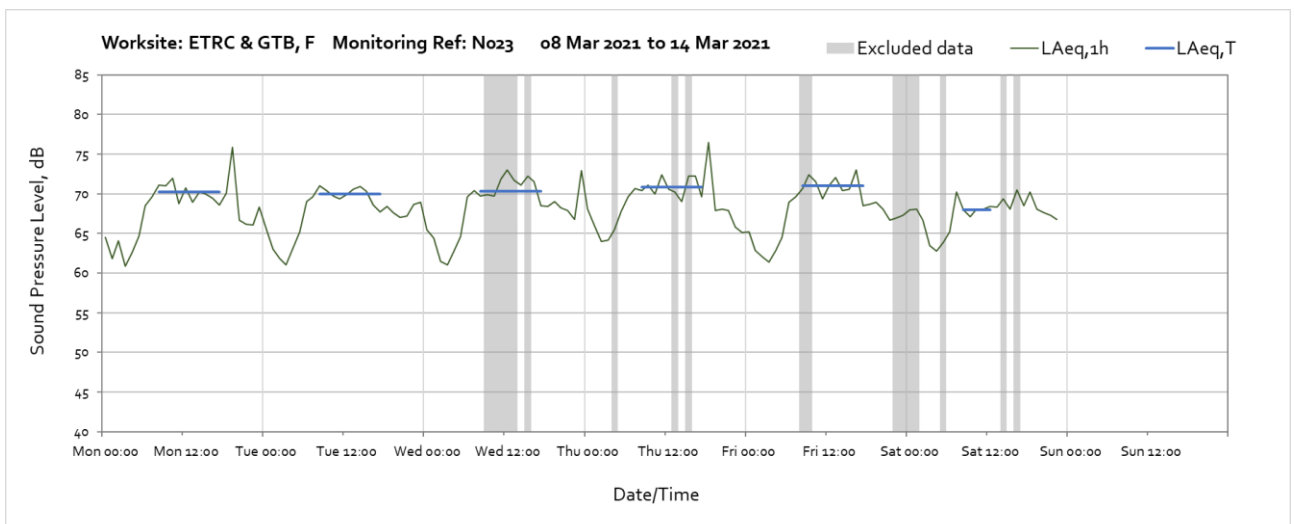
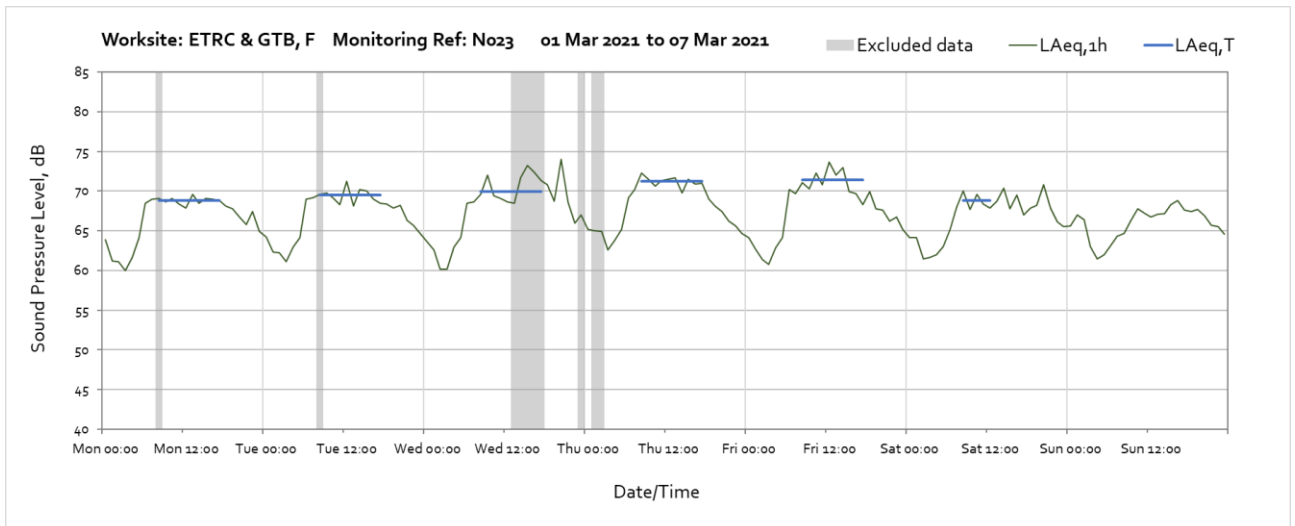


Note: Missing data from 00:00 until 03:00 on Thursday 25th March was due to a memory card fault. Missing data between 01:00 and 02:00 on Sunday 28th March was due to the clock change (start of BST).

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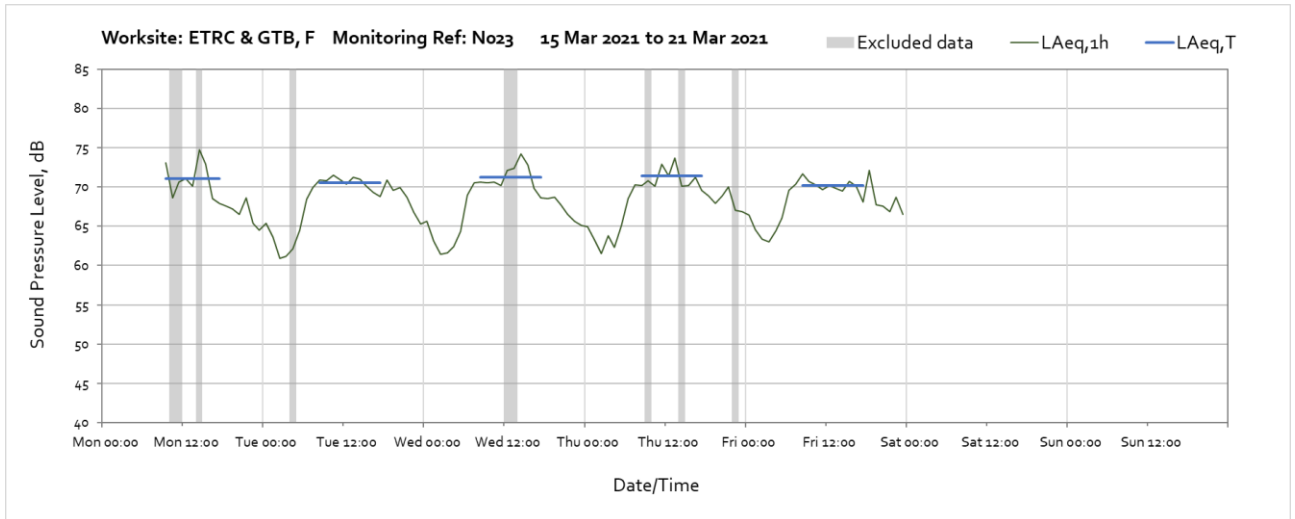


Worksite: ETRC – Monitoring Ref: N023

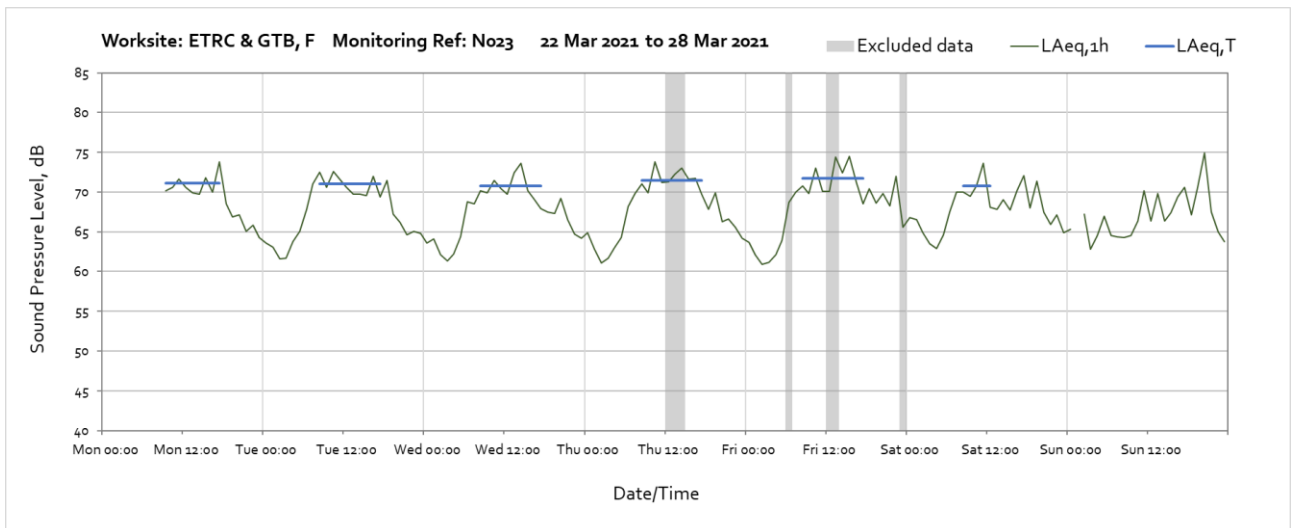


Note: Missing data from 23:00 on Saturday 13th March until 00:00 on Monday 15th March was due to internal memory space becoming full. The internal storage capacity of the monitoring station is currently being upgraded to prevent further data loss.

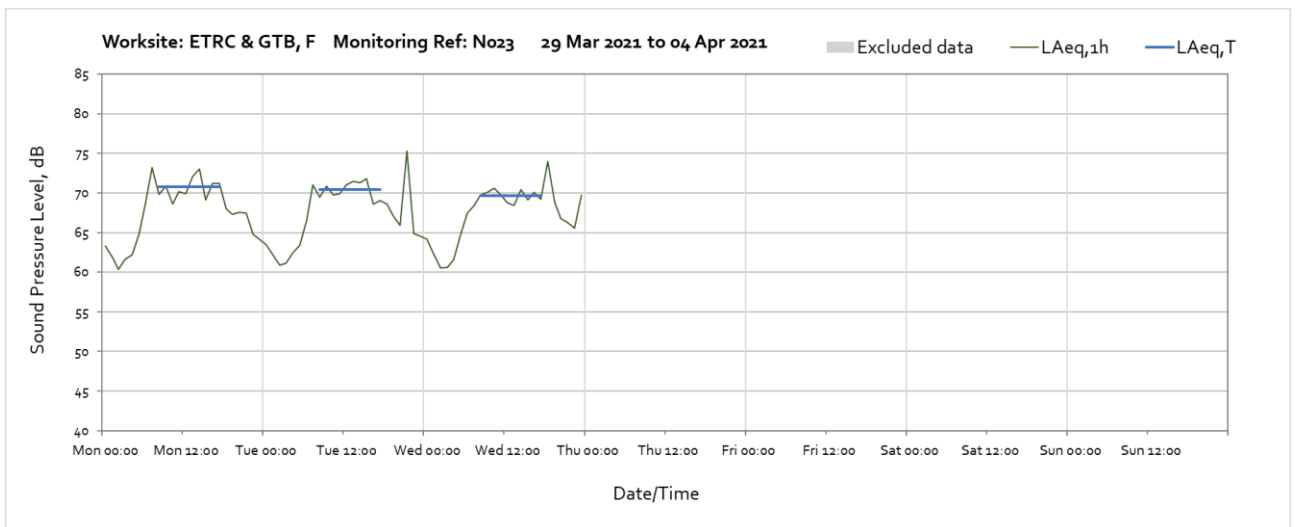
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Note: Missing data from 00:00 until 09:00 on Monday 15th March and from 00:00 on Saturday 20th March until 00:00 on Monday 22nd March was due to internal memory space becoming full. The internal storage capacity of the monitoring station is currently being upgraded to prevent further data loss.

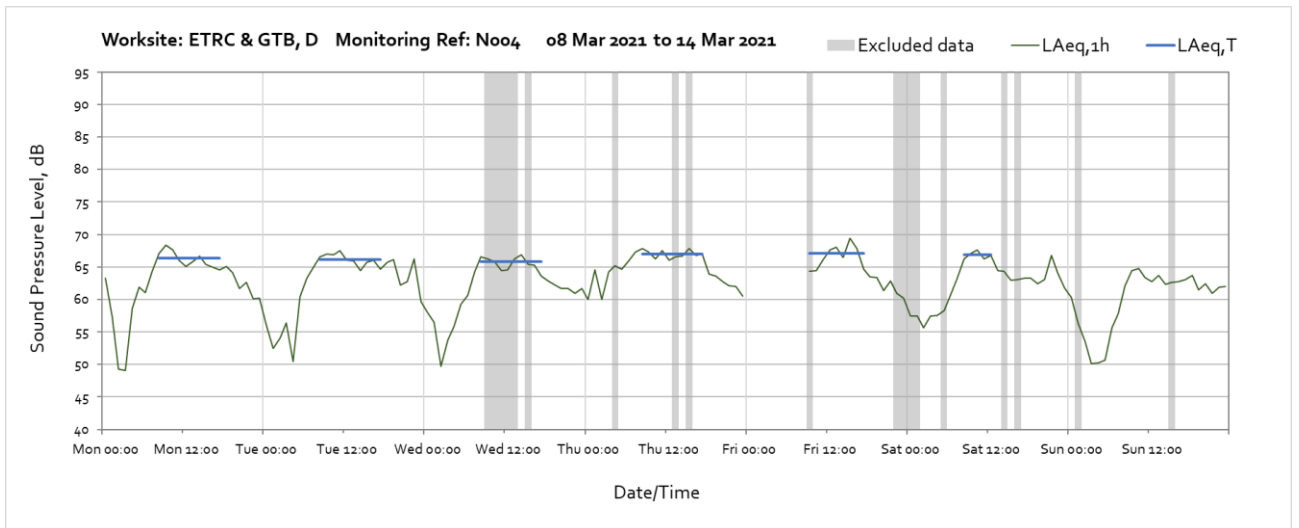
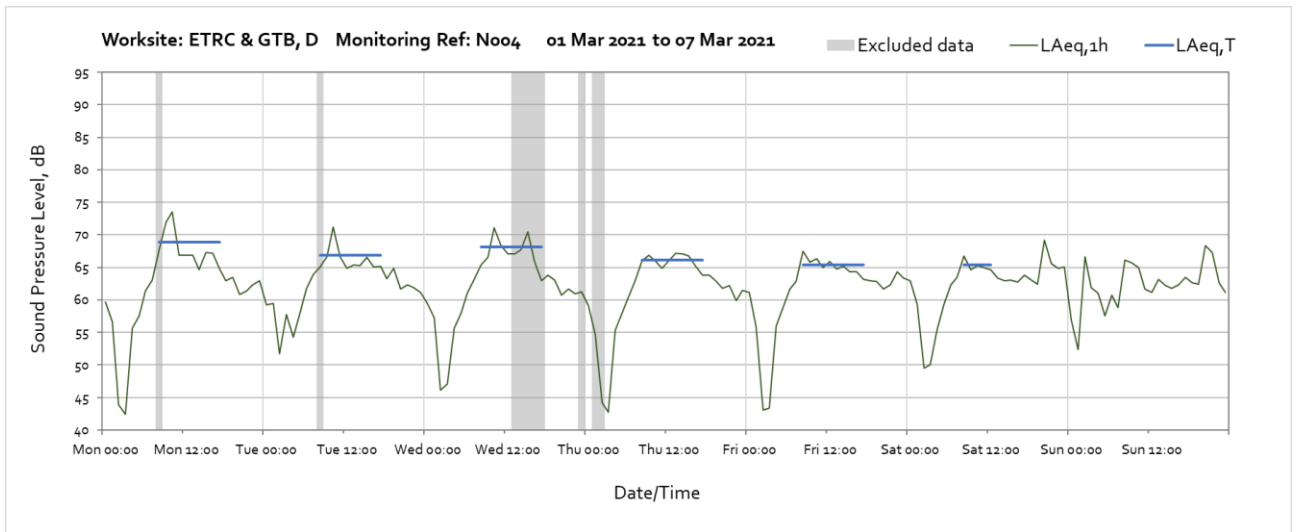


Note: Missing data from 00:00 until 09:00 on Monday 22nd March was due to internal memory space becoming full. The internal storage capacity of the monitoring station is currently being upgraded to prevent further data loss. Missing data between 01:00 and 02:00 on Sunday 28th March was due to the clock change (start of BST).

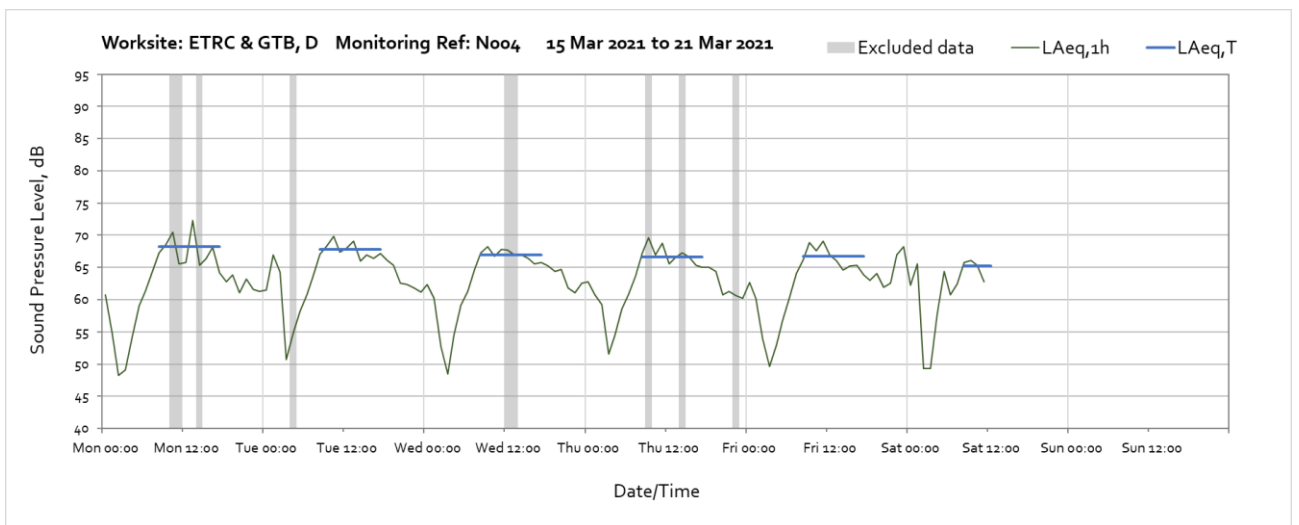


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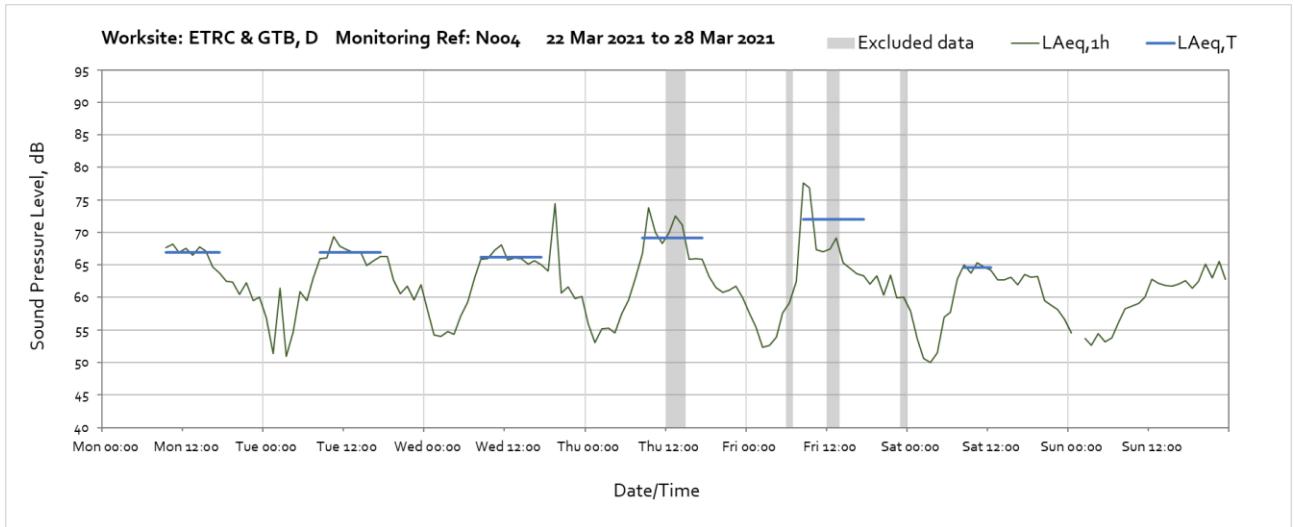
Worksite: ETRC & GTB, D – Monitoring Ref: N004



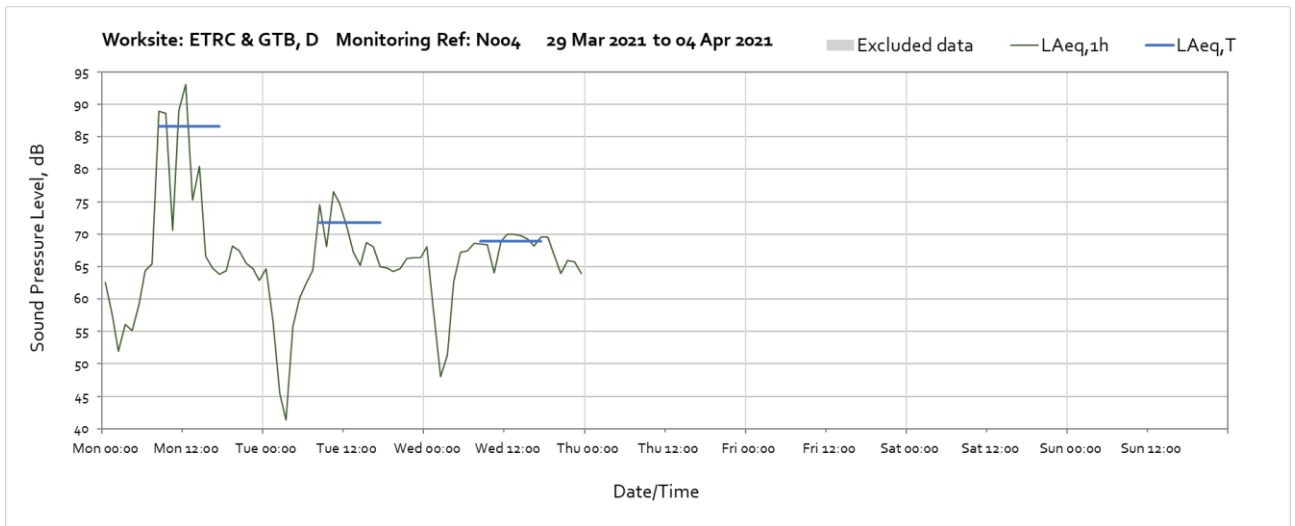
Note: Missing data from 00:00 until 09:00 on Friday 12th March was due to internal memory space becoming full. The internal storage capacity of the monitoring station is currently being upgraded to prevent further data loss.



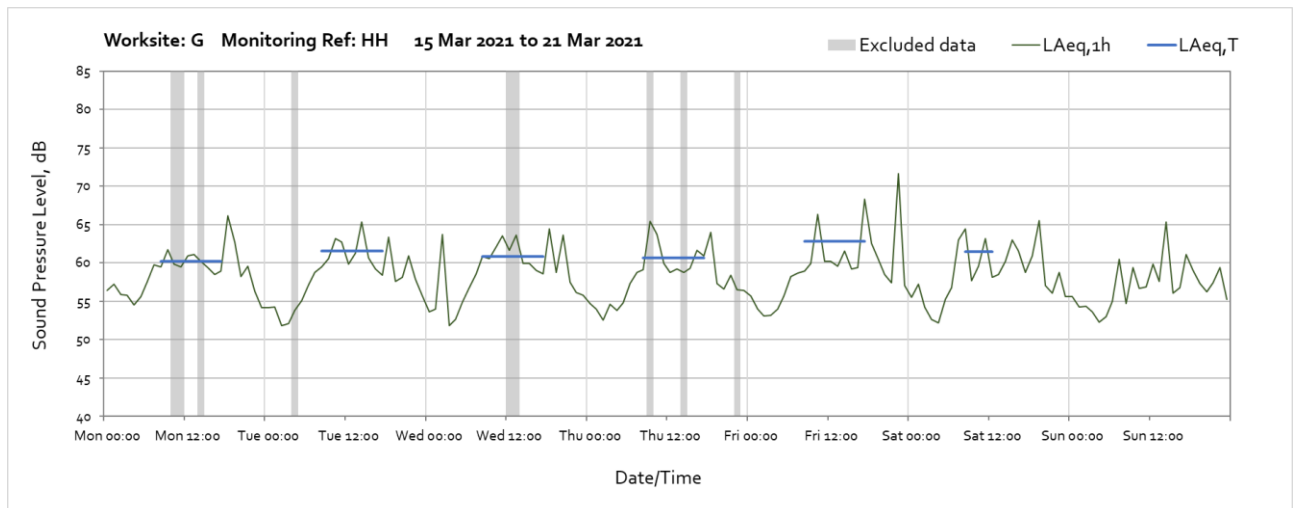
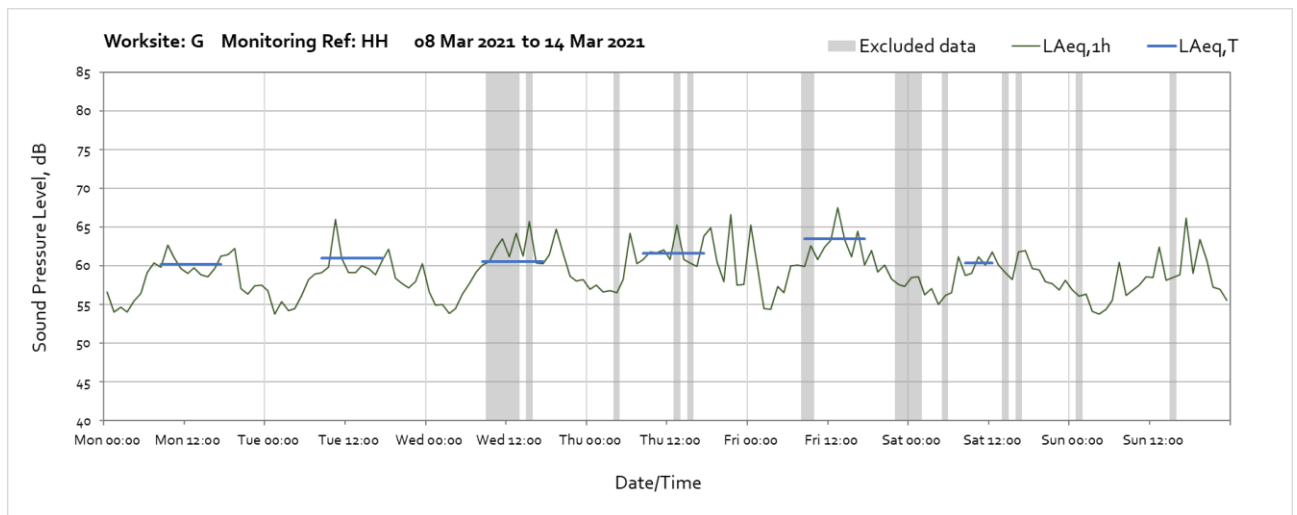
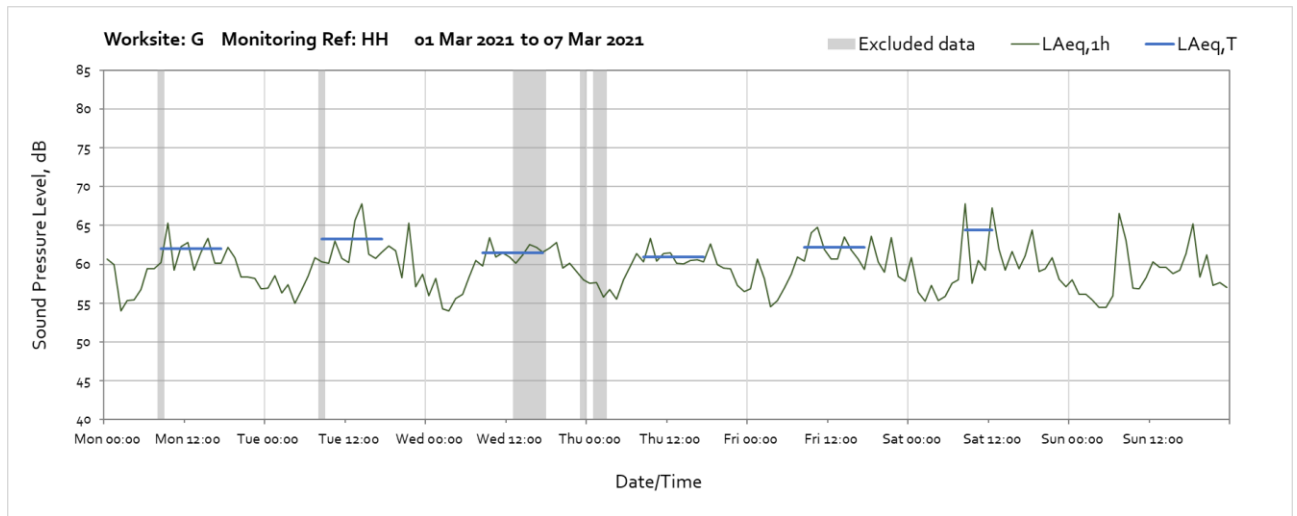
Note: Missing data from 12:00 on Saturday 20th March until 00:00 on Monday 22nd March was due to internal memory space becoming full. The internal storage capacity of the monitoring station is currently being upgraded to prevent further data loss.

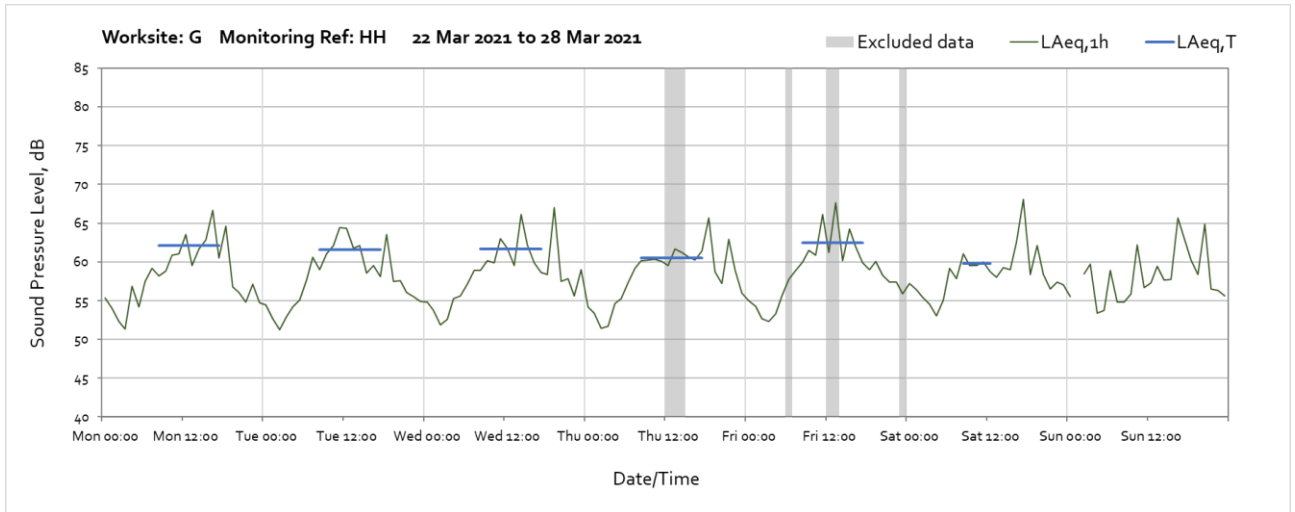


Note: Missing data from 00:00 until 09:00 on Monday 22nd was due to internal memory space becoming full. The internal storage capacity of the monitoring station is currently being upgraded to prevent further data loss. Missing data between 01:00 and 02:00 on Sunday 28th March was due to the clock change (start of BST).

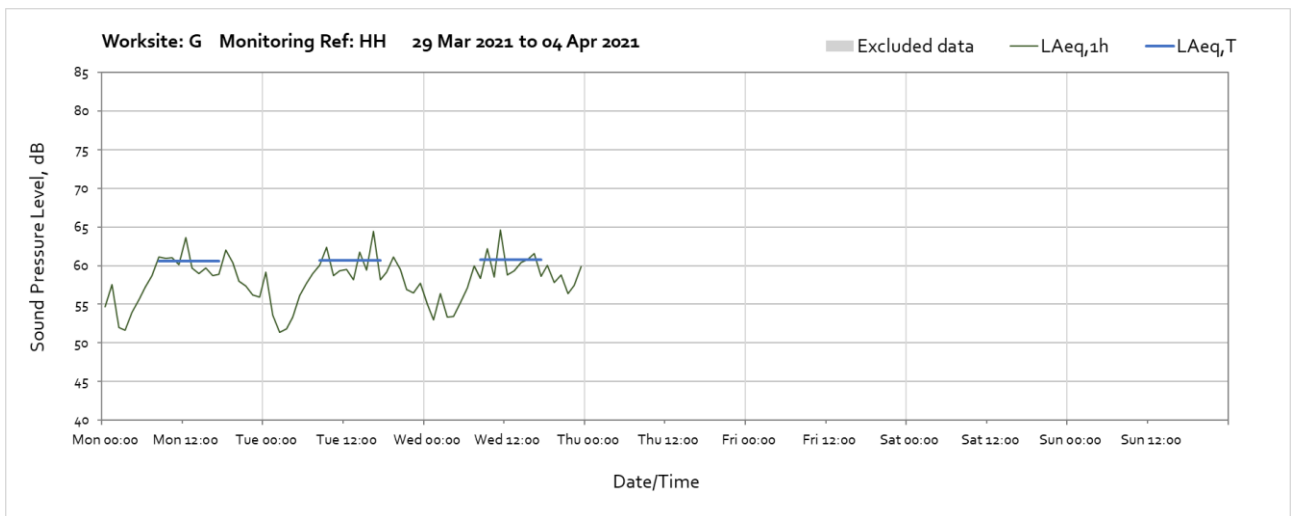


Worksite: G – Monitoring Ref: HH

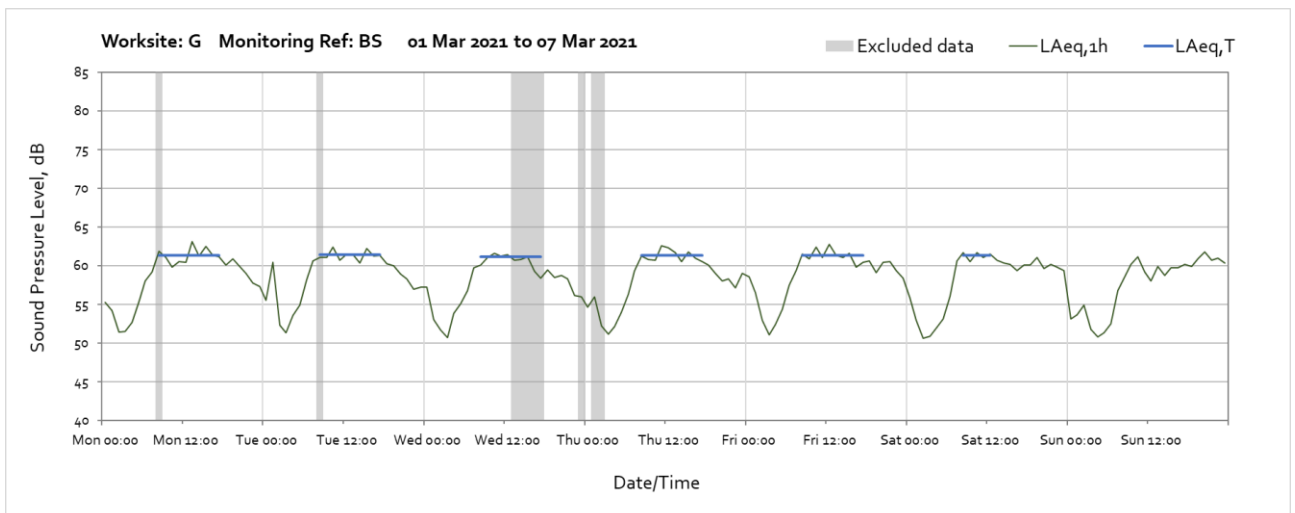


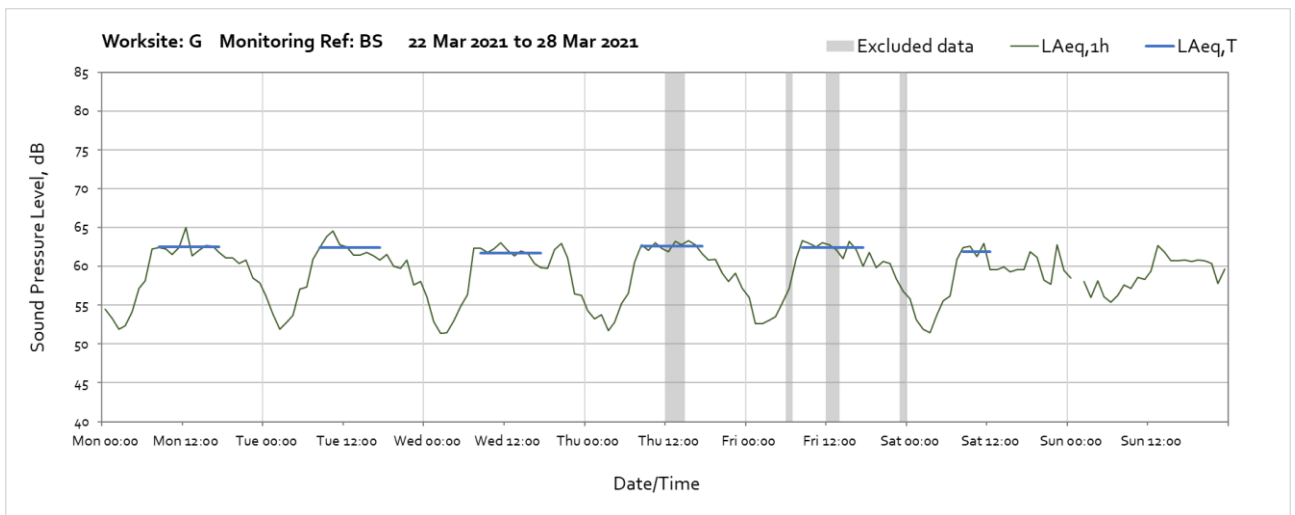
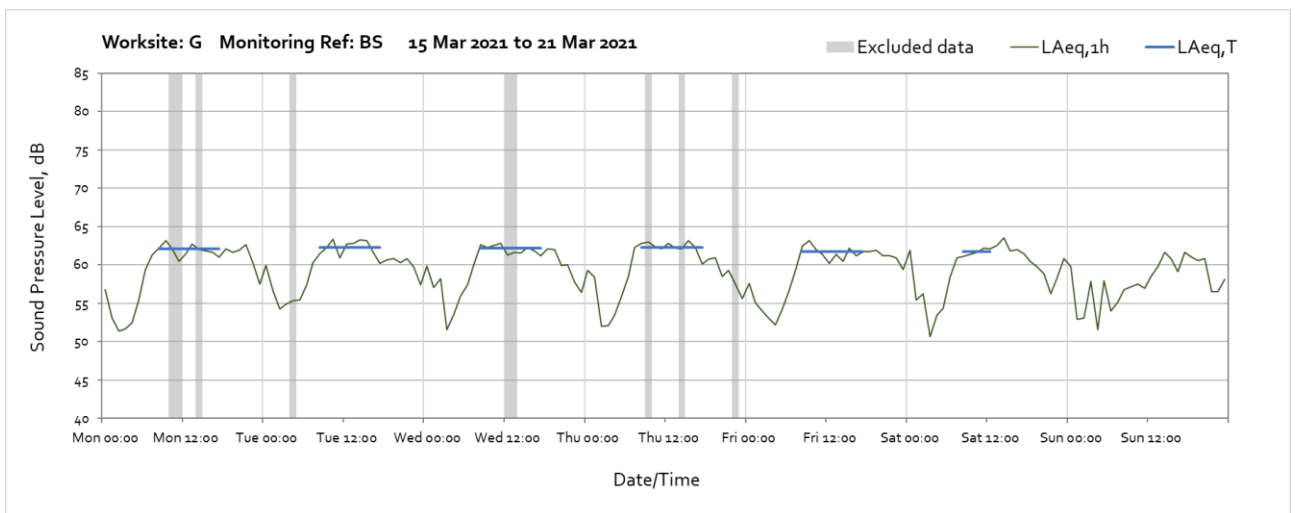
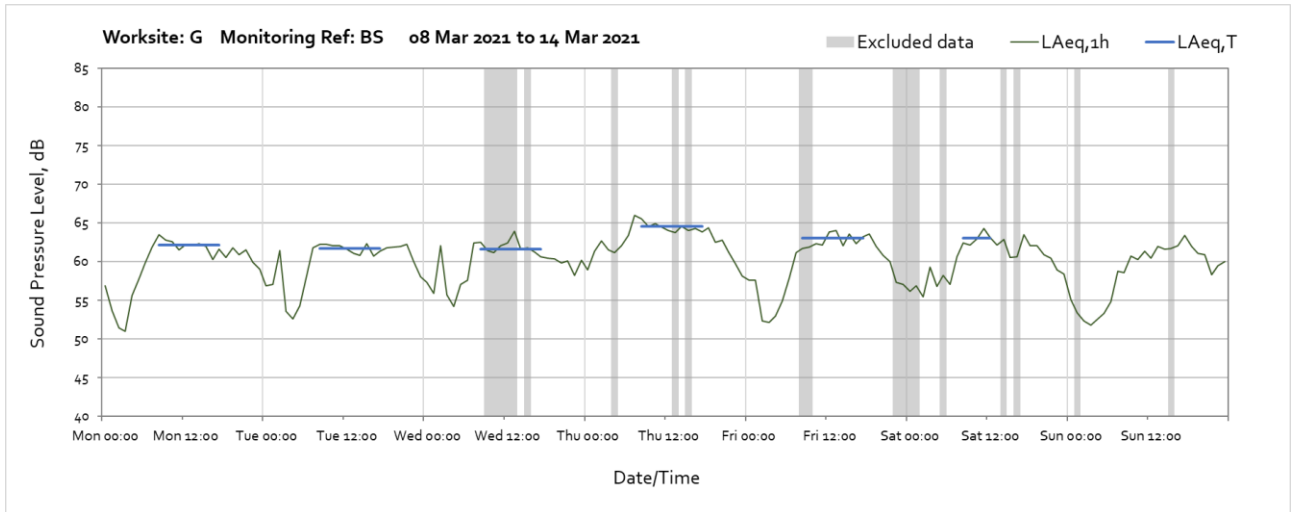


Note: Missing data between 01:00 and 02:00 on Sunday 28th March was due to the clock change (start of BST).

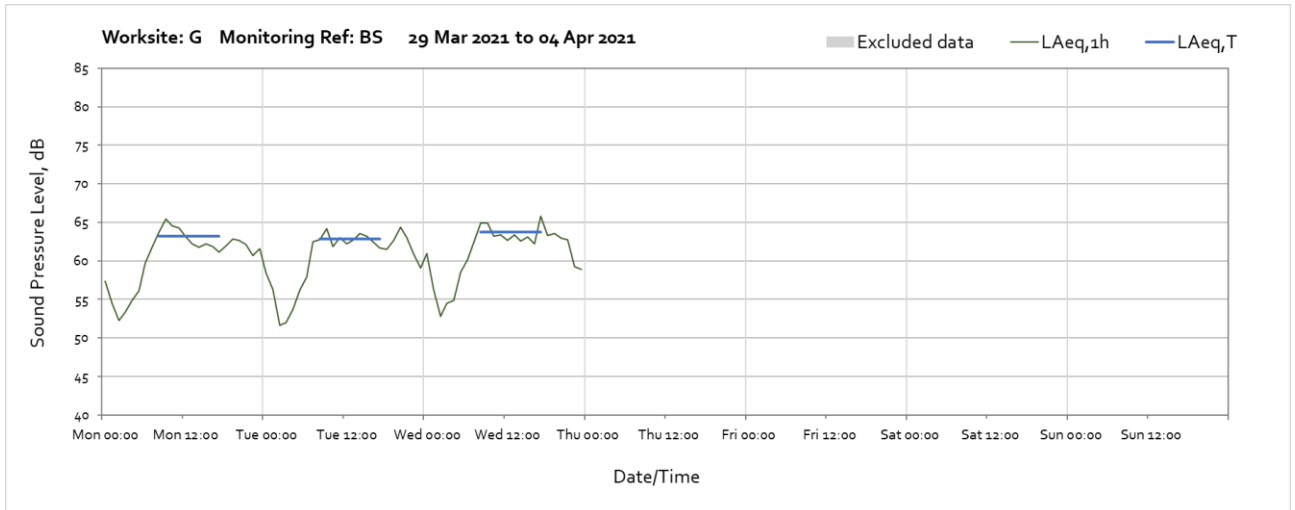


Worksite: G – Monitoring Ref: BS

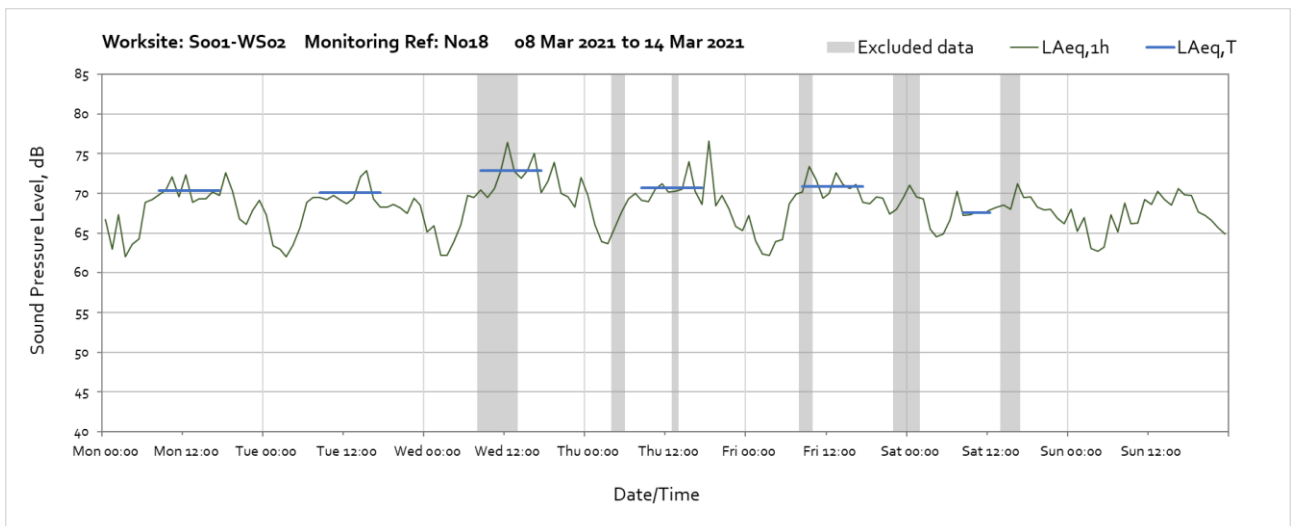
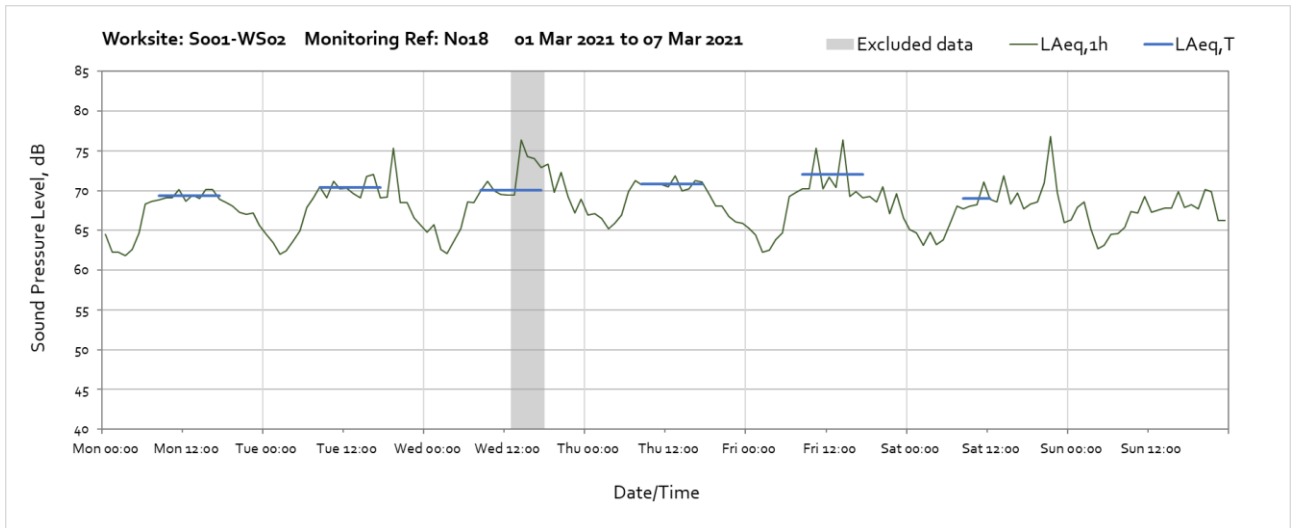


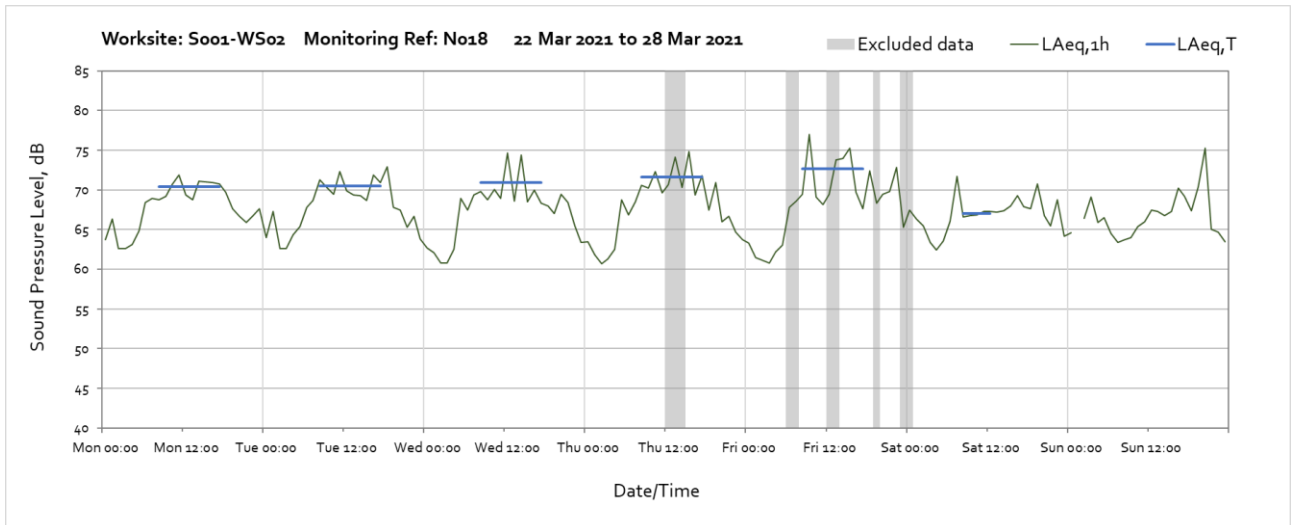
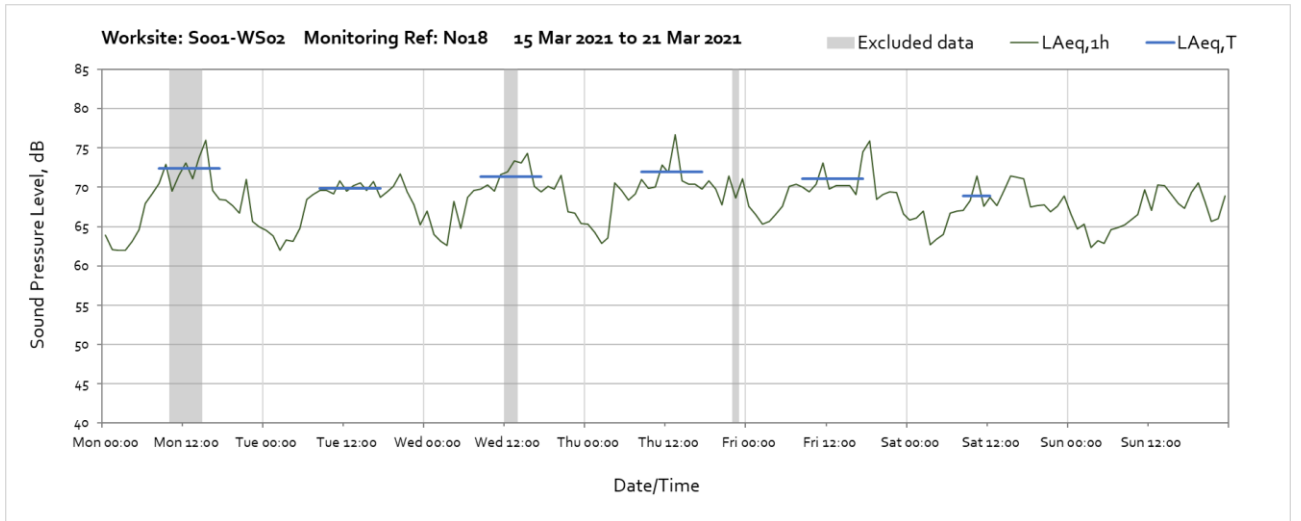


Note: Missing data between 01:00 and 02:00 on Sunday 28th March was due to the clock change (start of BST).

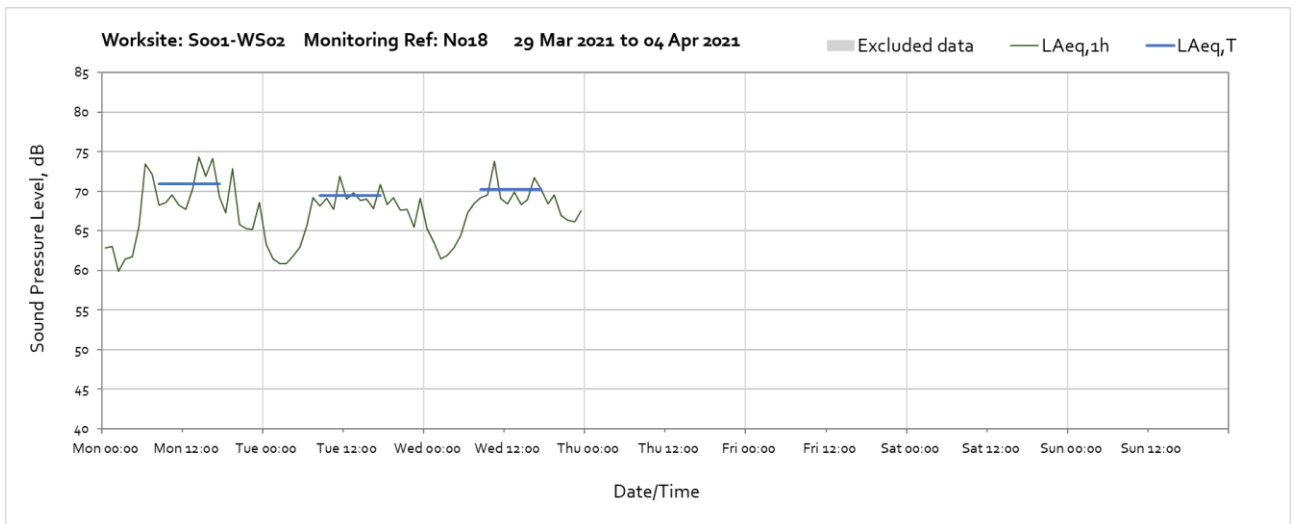


Worksite: S001-WS02 – Monitoring Ref: N018

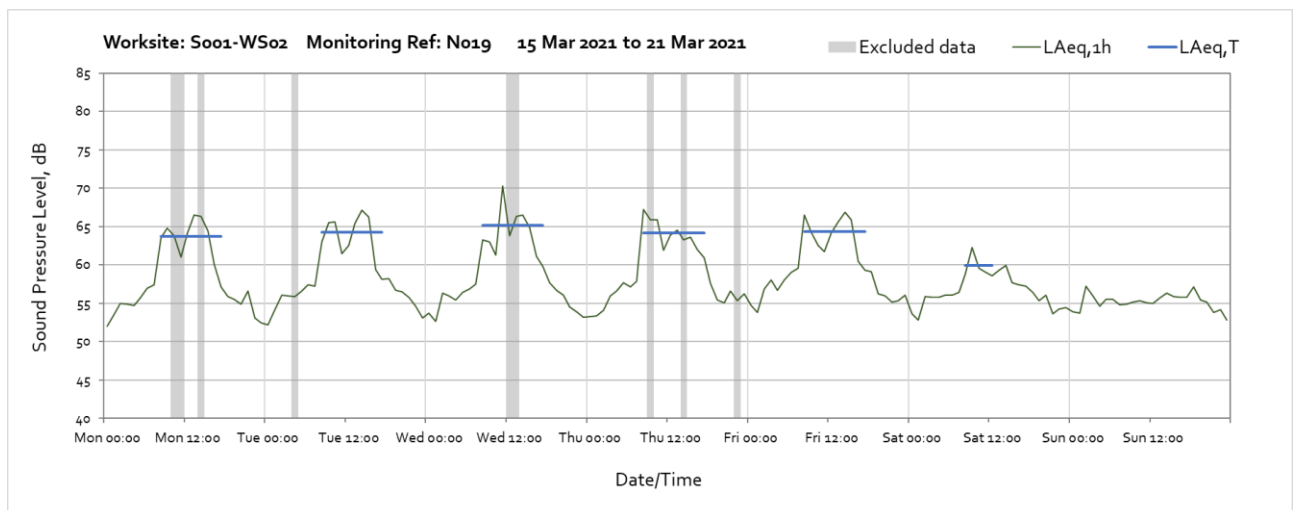
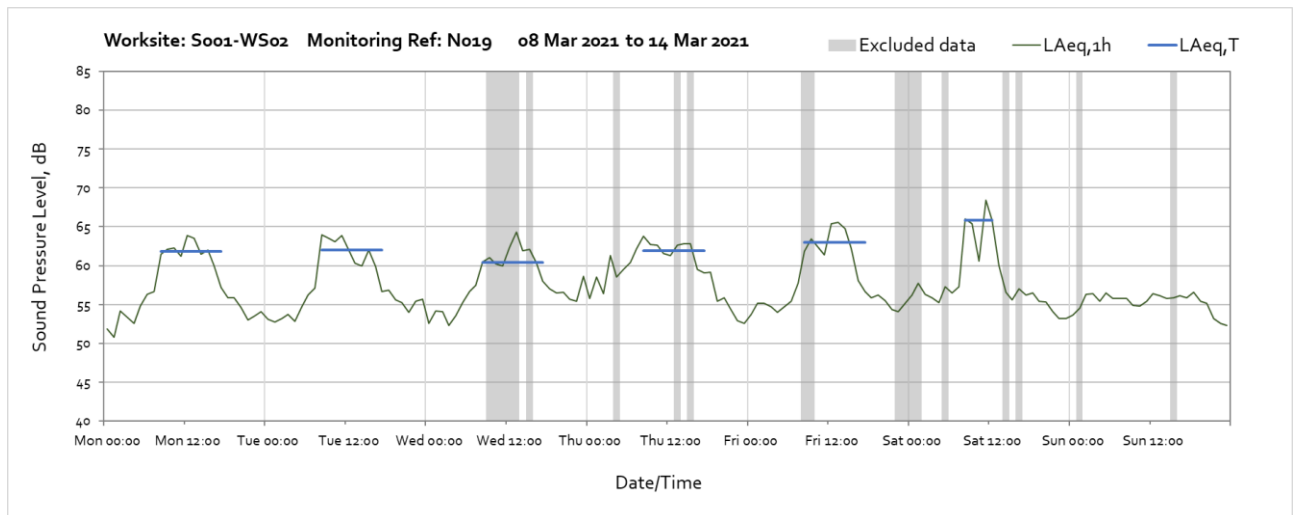
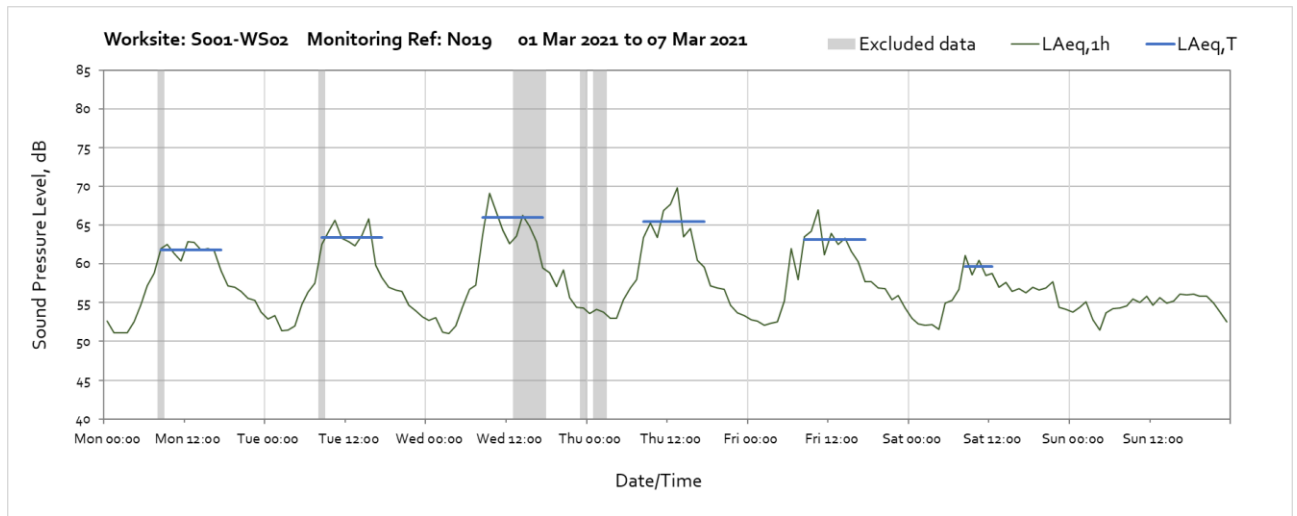




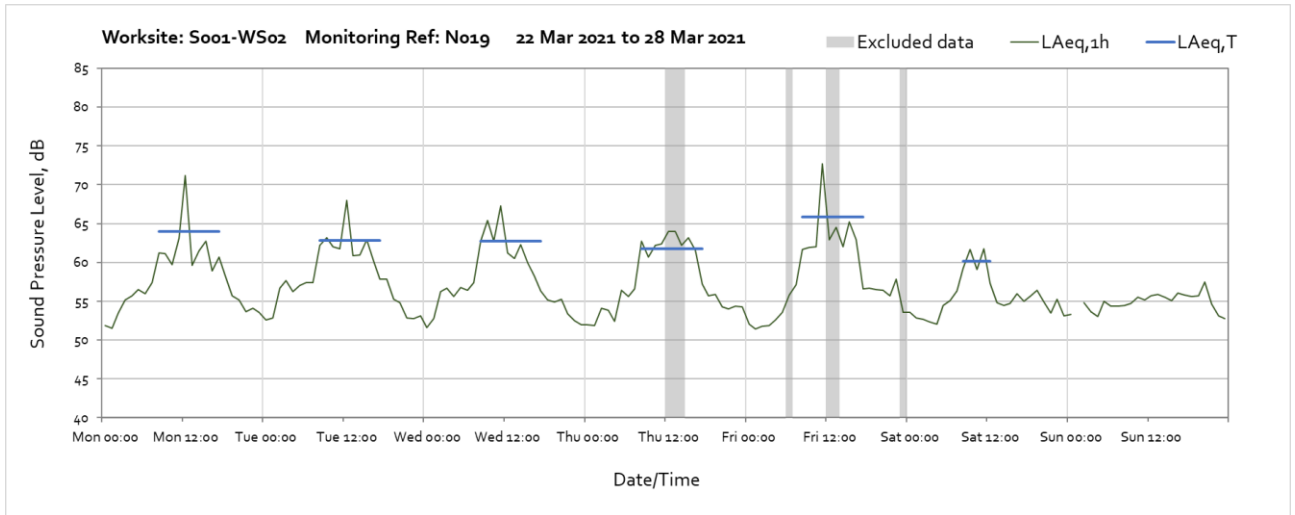
Note: Missing data between 01:00 and 02:00 on Sunday 28th March was due to the clock change (start of BST).



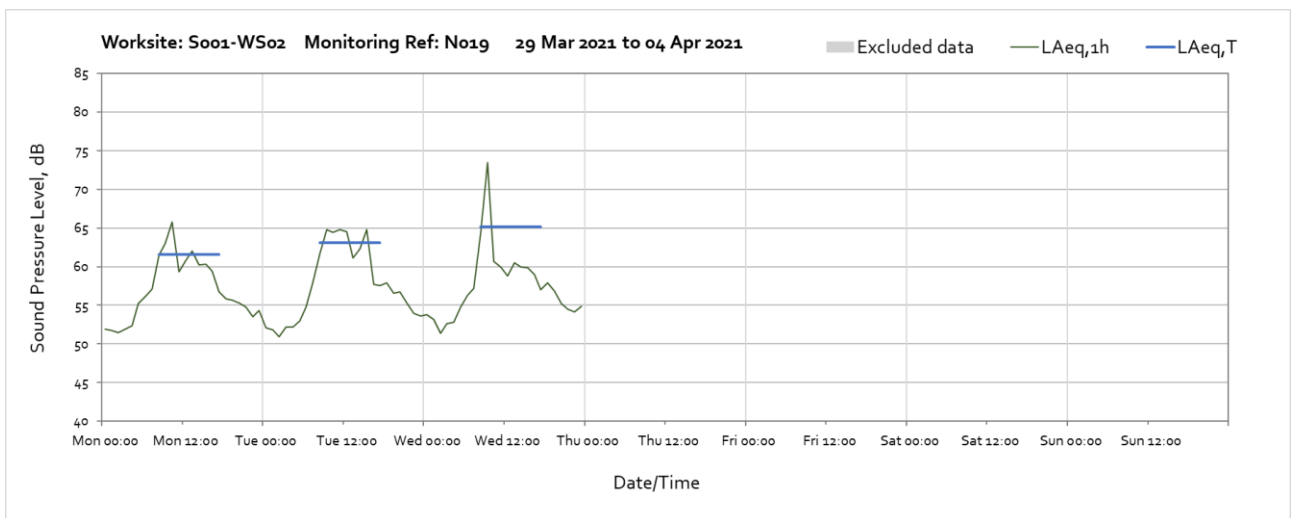
Worksite: S001-WS02 – Monitoring Ref: N019



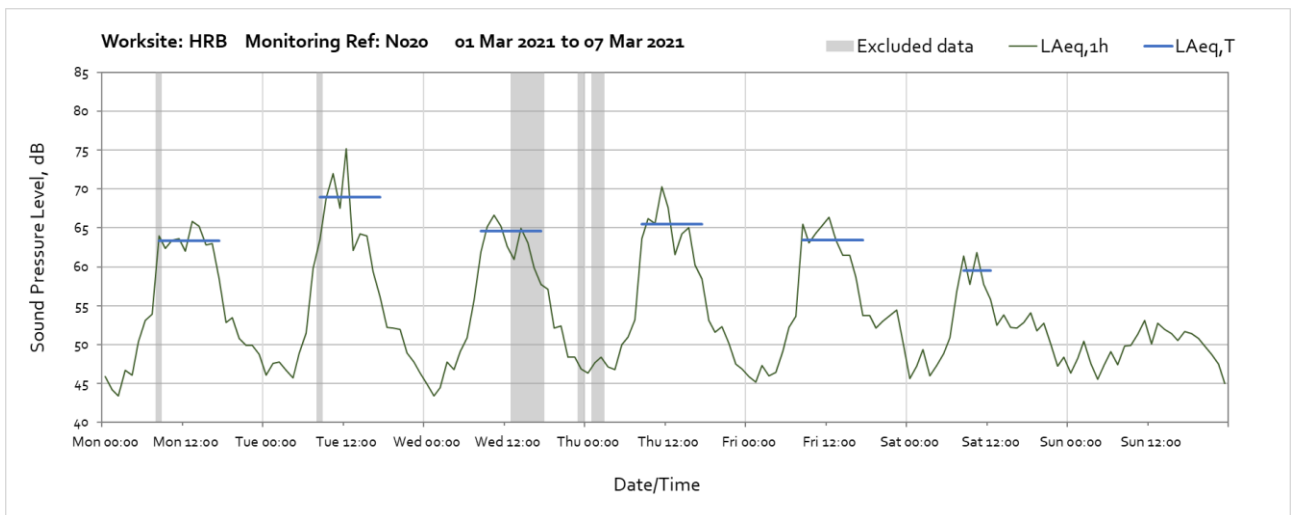
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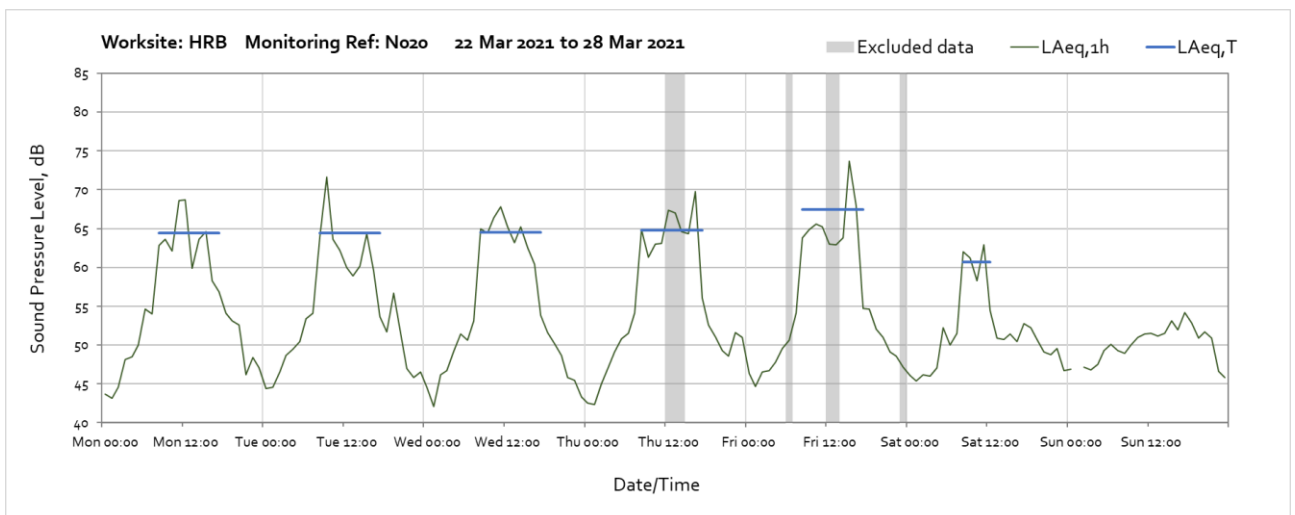
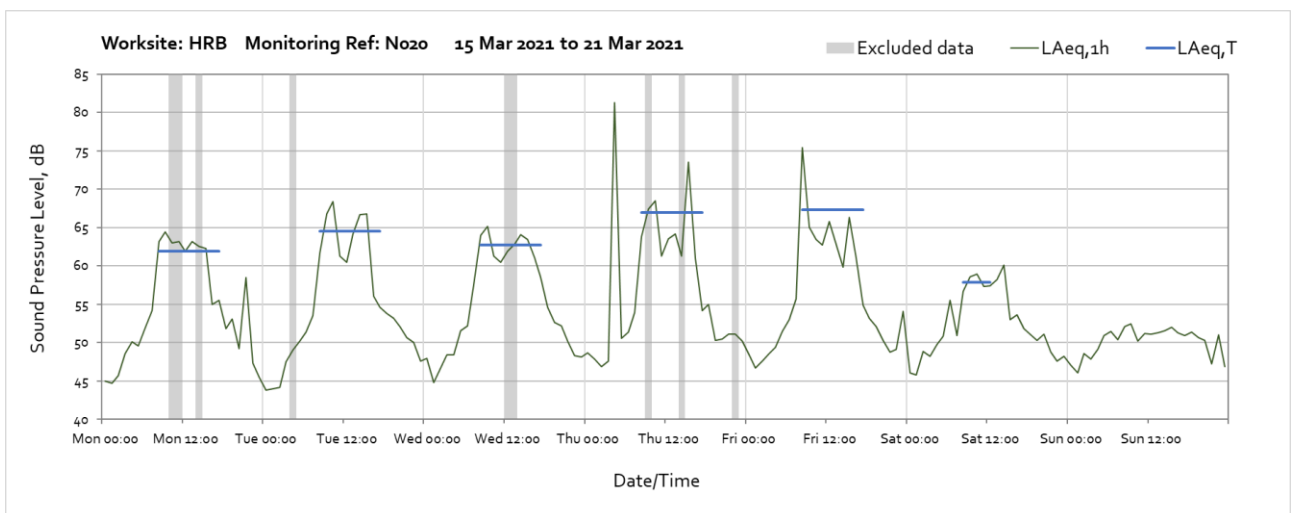
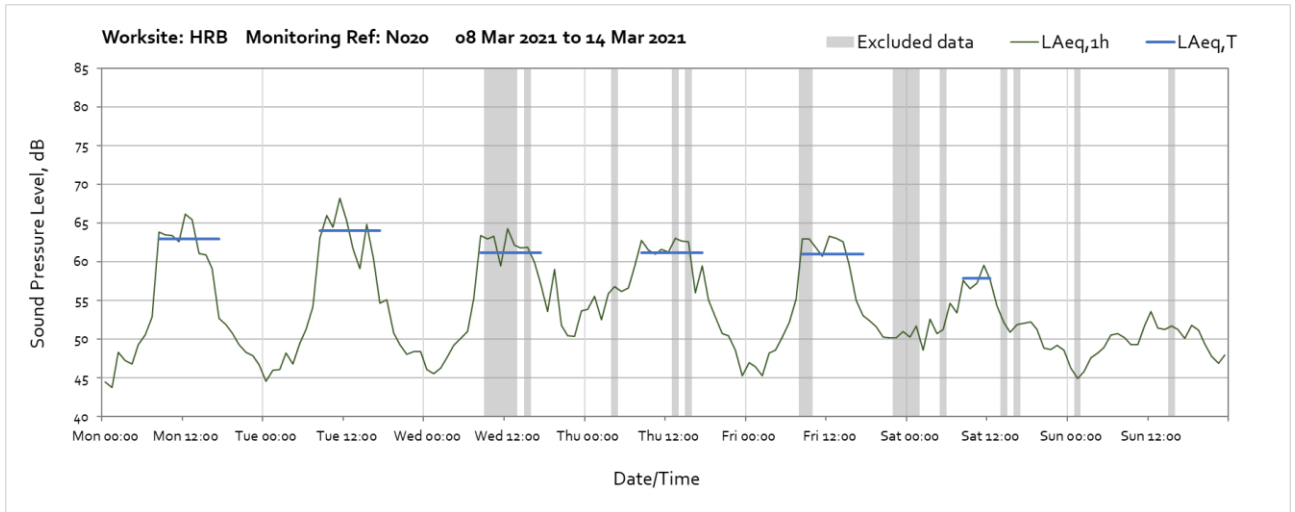


Note: Missing data between 01:00 and 02:00 on Sunday 28th March was due to the clock change (start of BST).

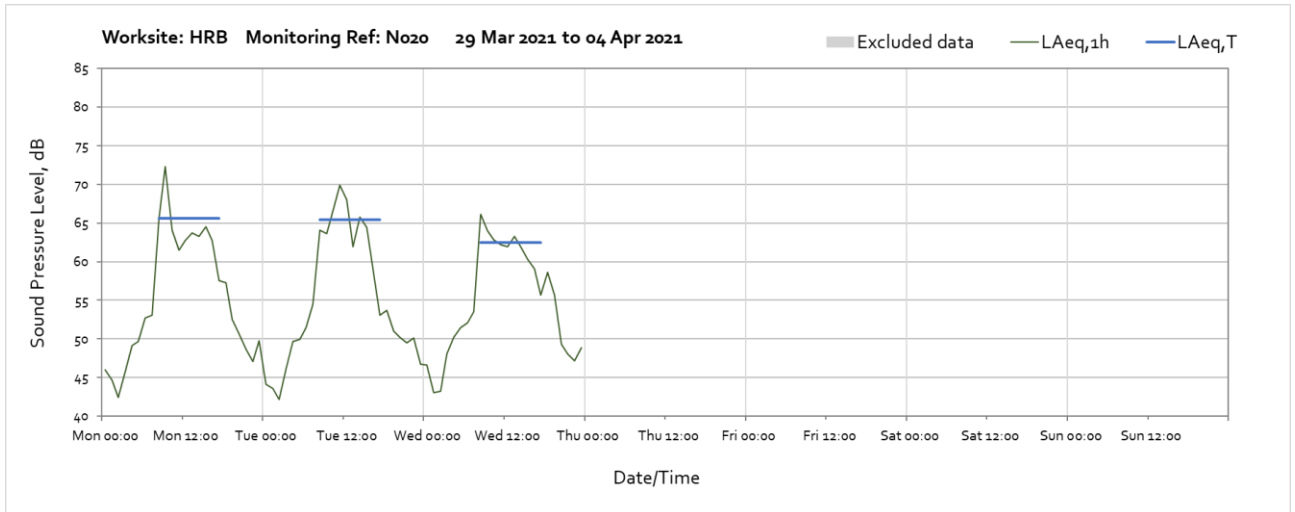


Worksite: HRB – Monitoring Ref: N020

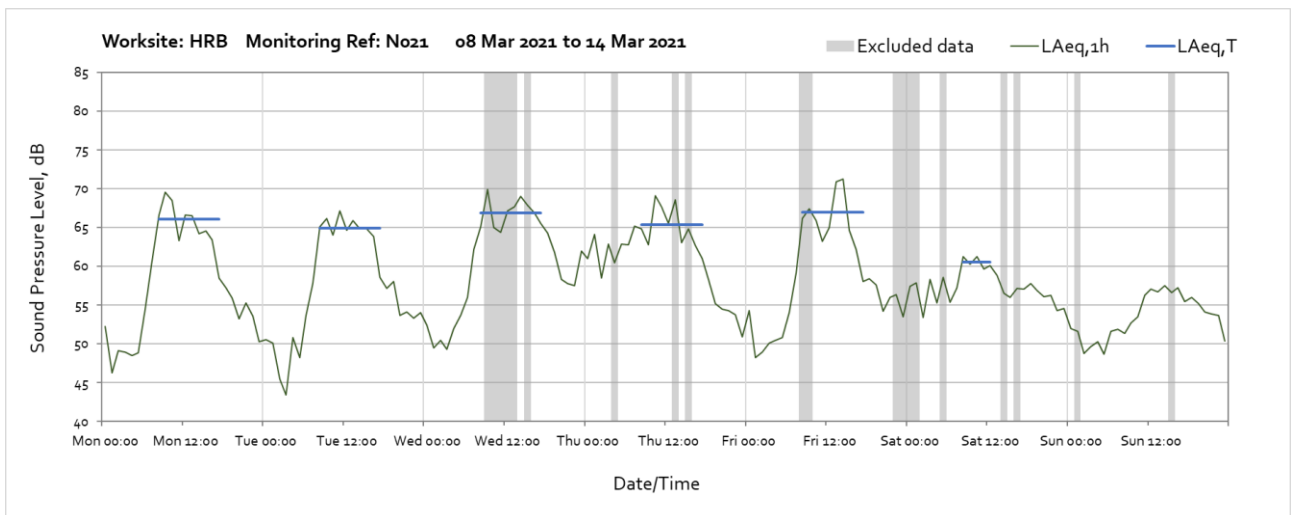
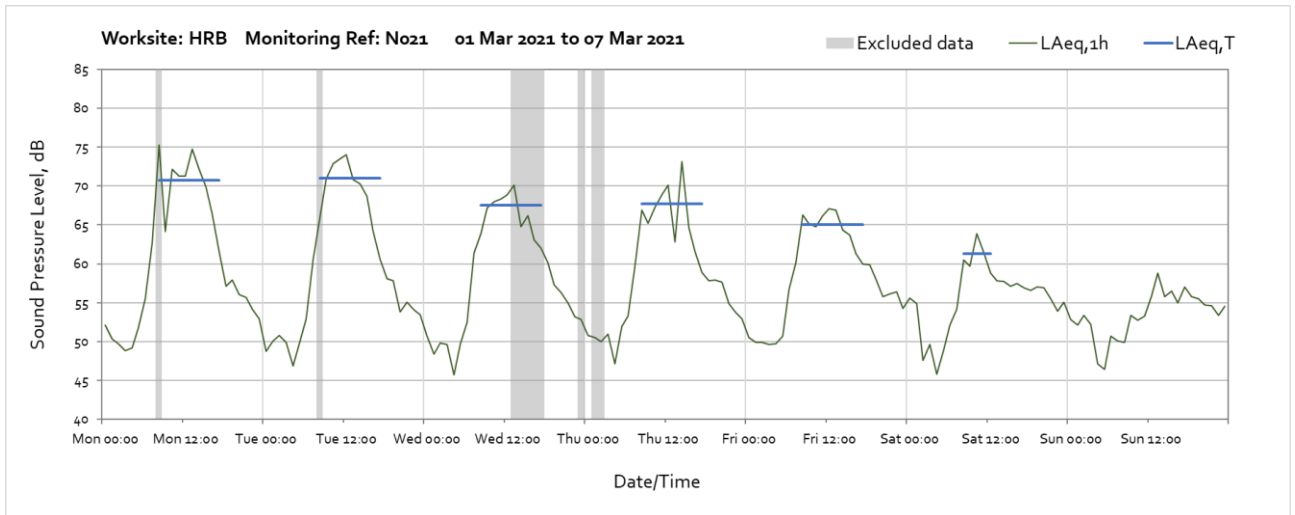


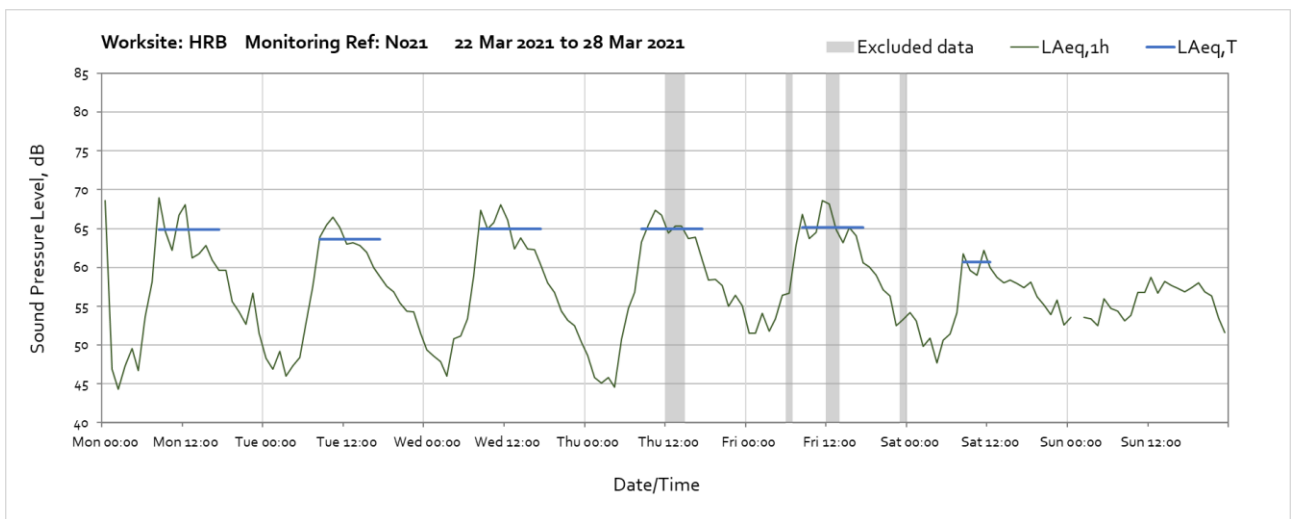
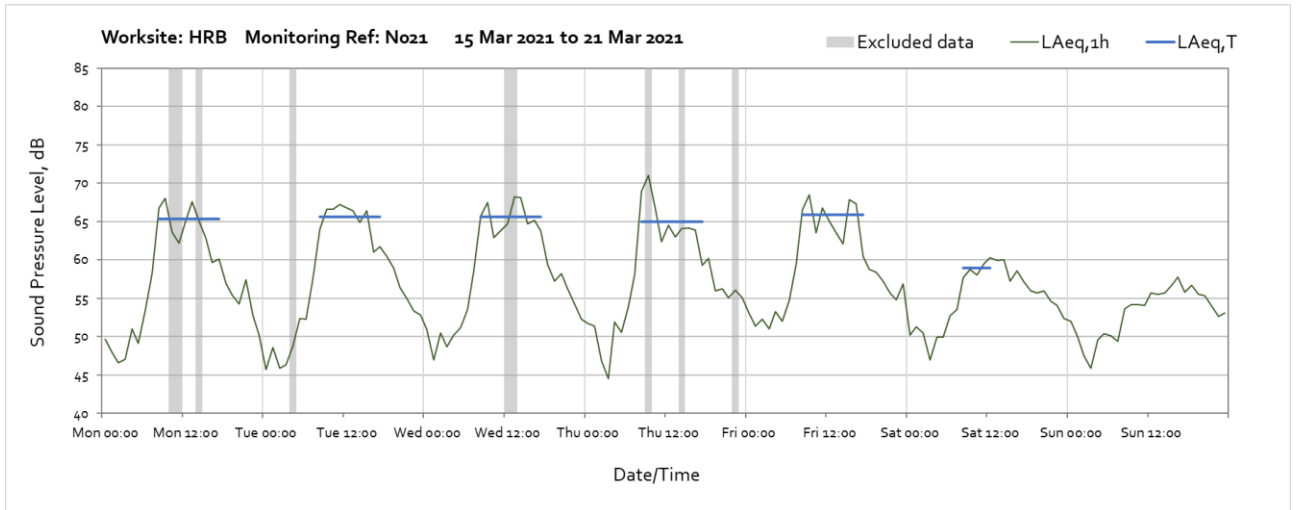


Note: Missing data between 01:00 and 02:00 on Sunday 28th March was due to the clock change (start of BST).

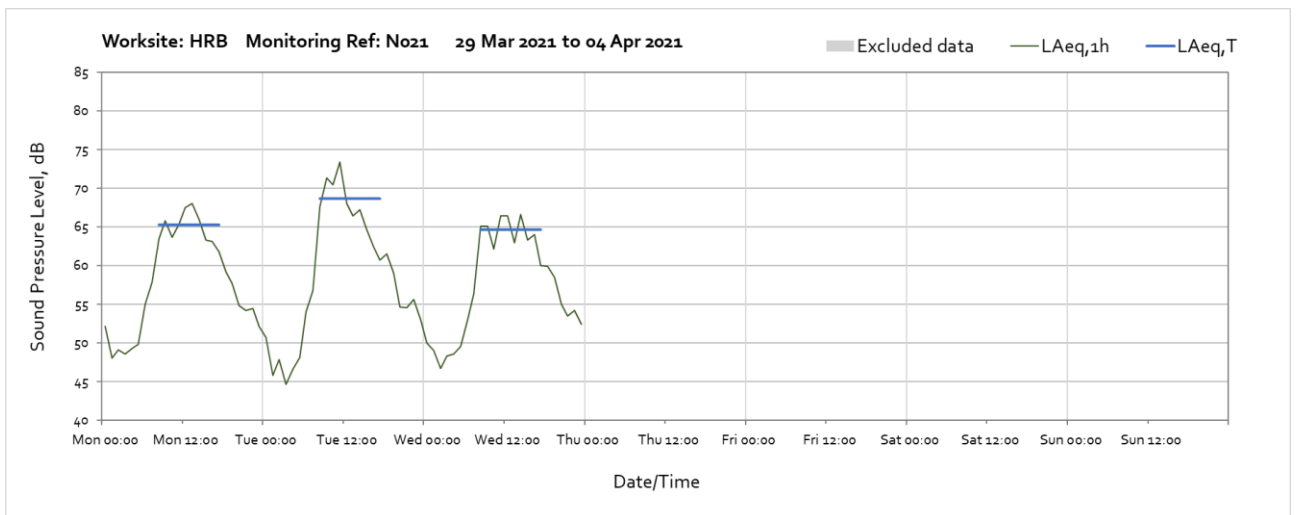


Worksite: HRB – Monitoring Ref: N021

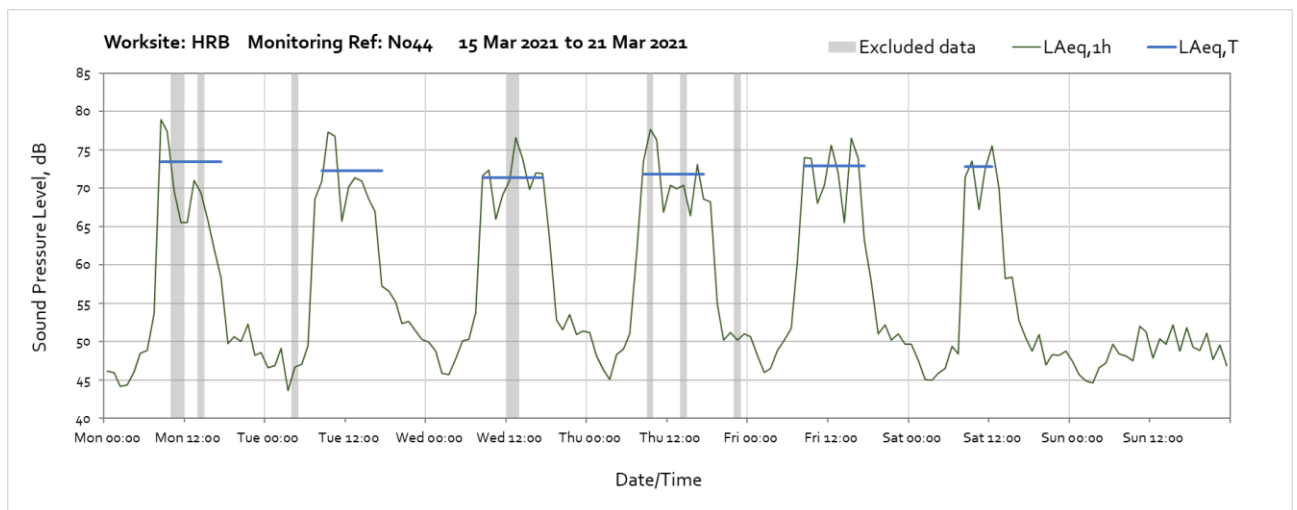
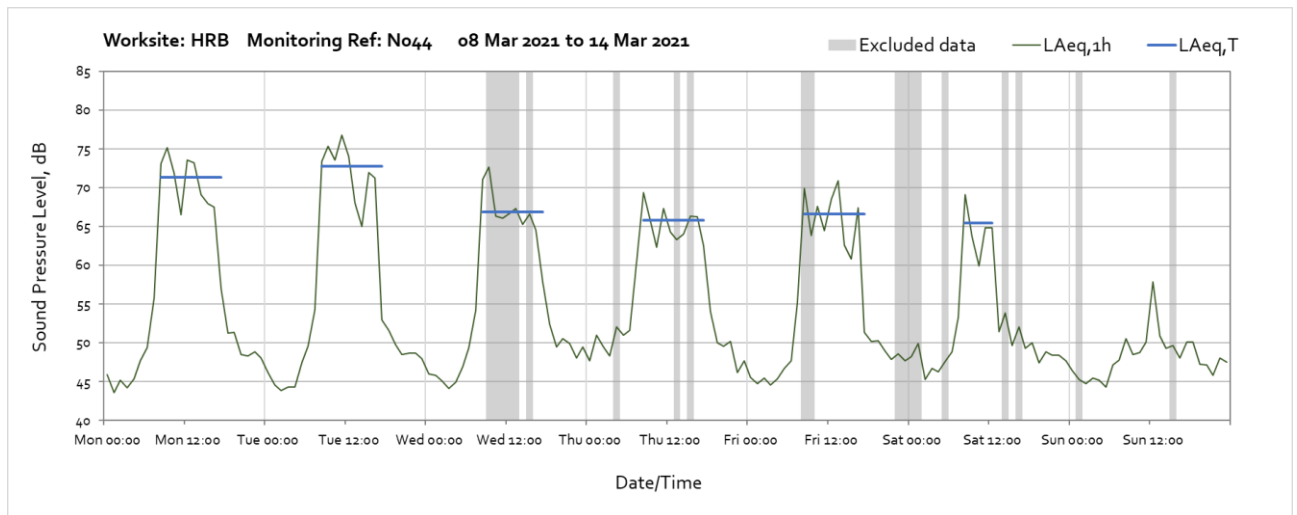
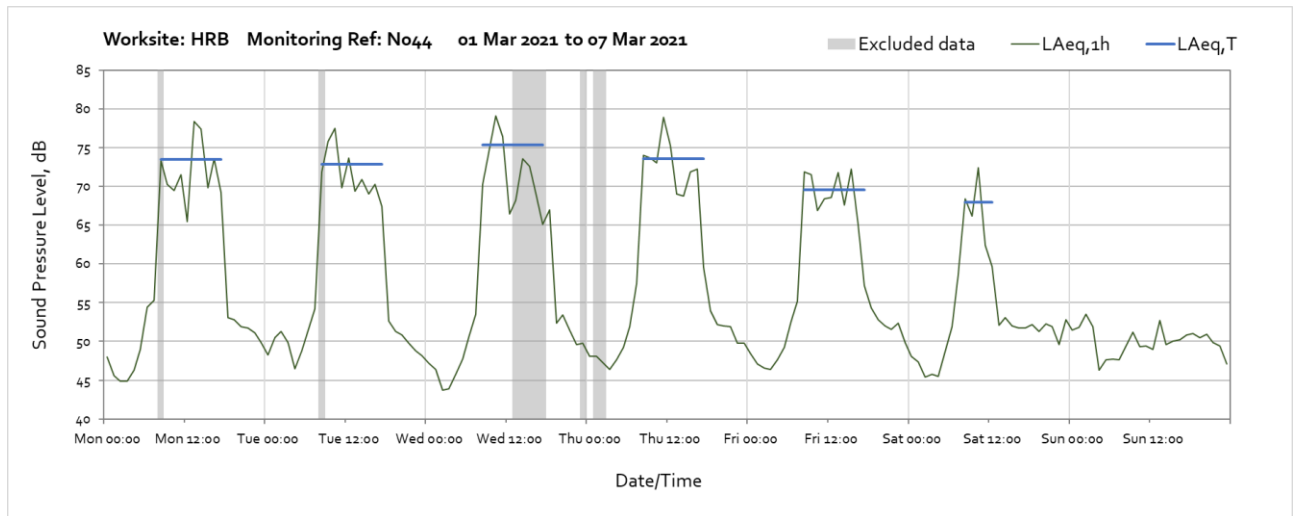




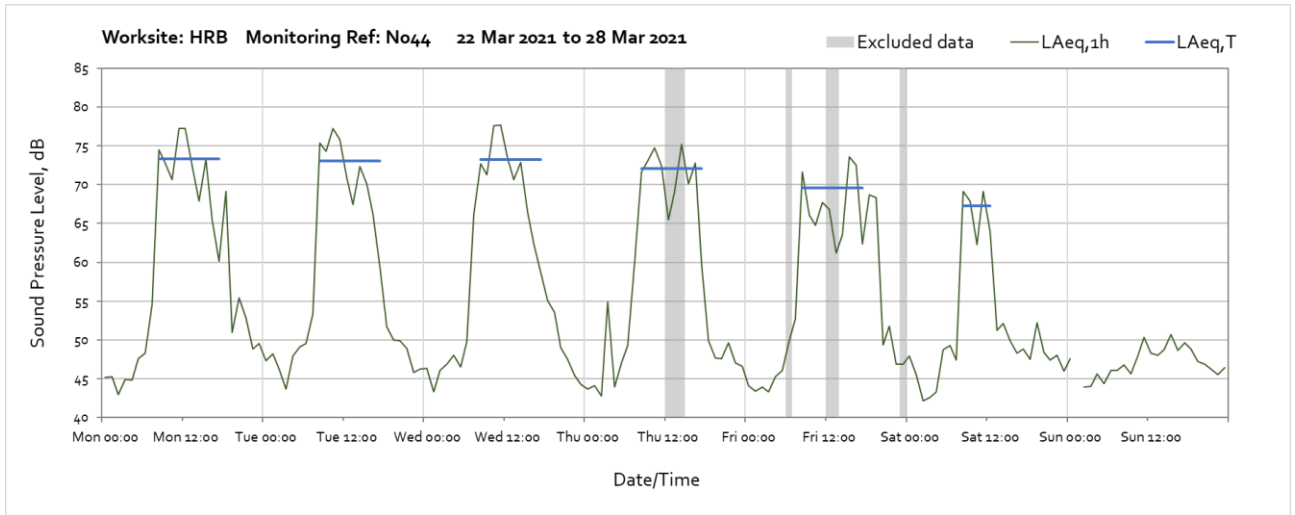
Note: Missing data between 01:00 and 02:00 on Sunday 28th March was due to the clock change (start of BST).



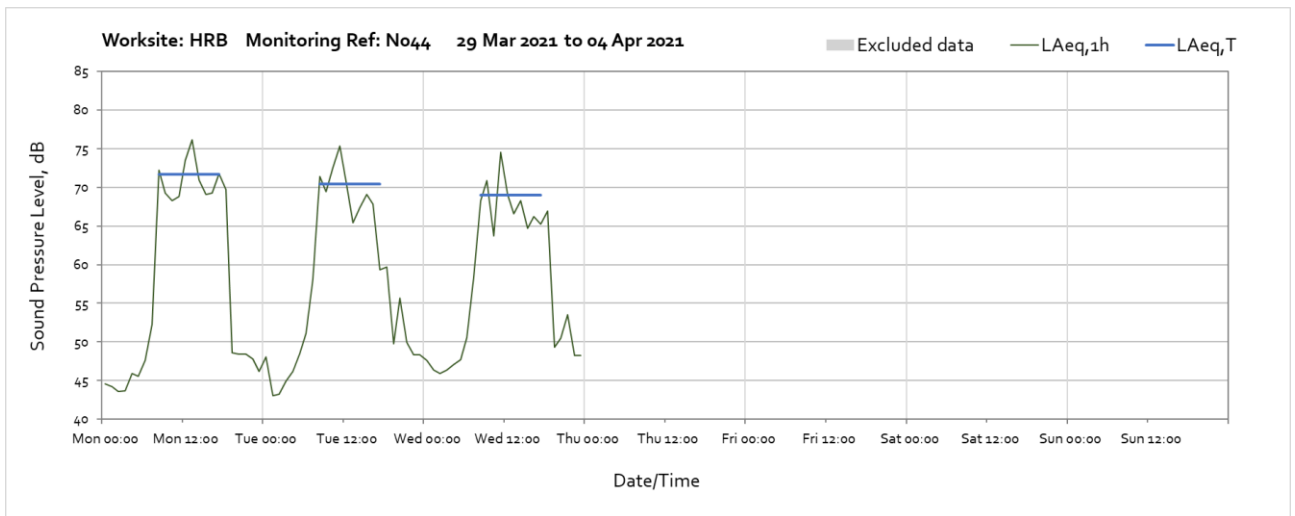
Worksite: HRB – Monitoring Ref: N044



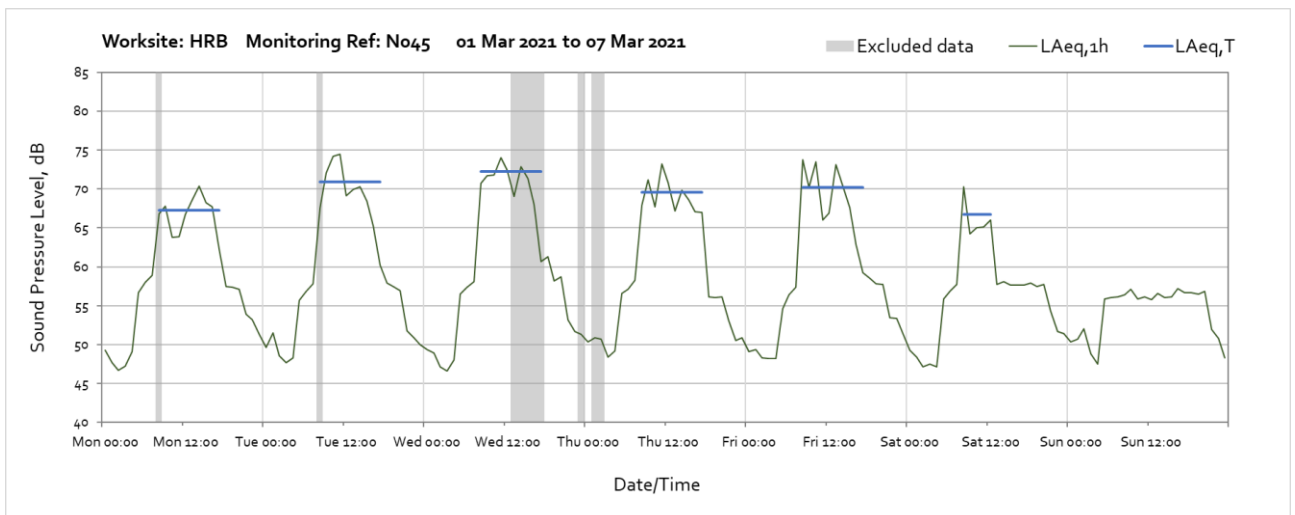
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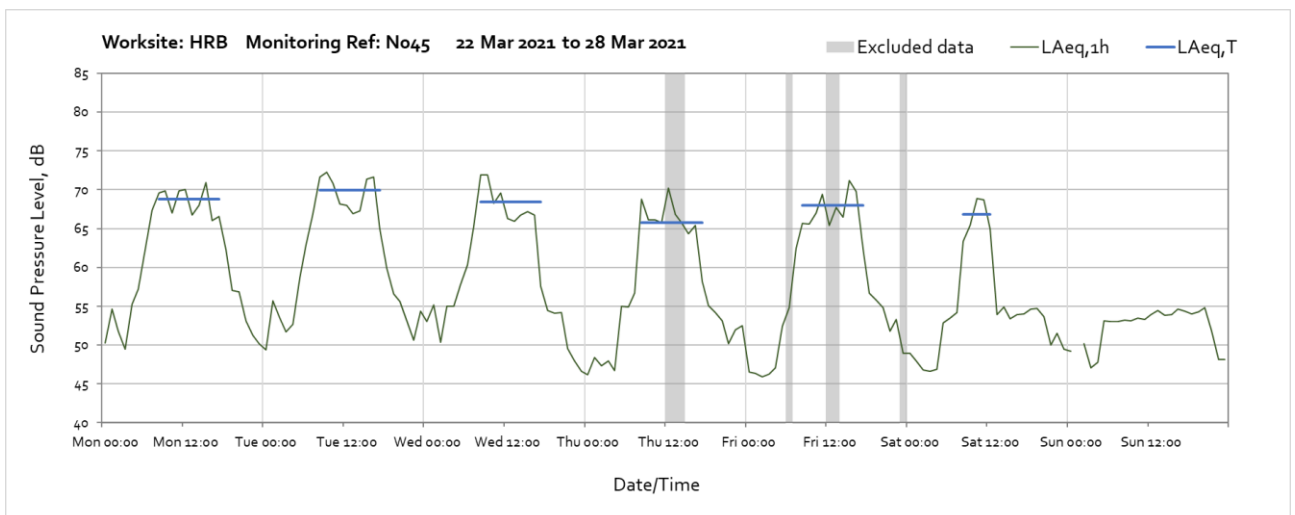
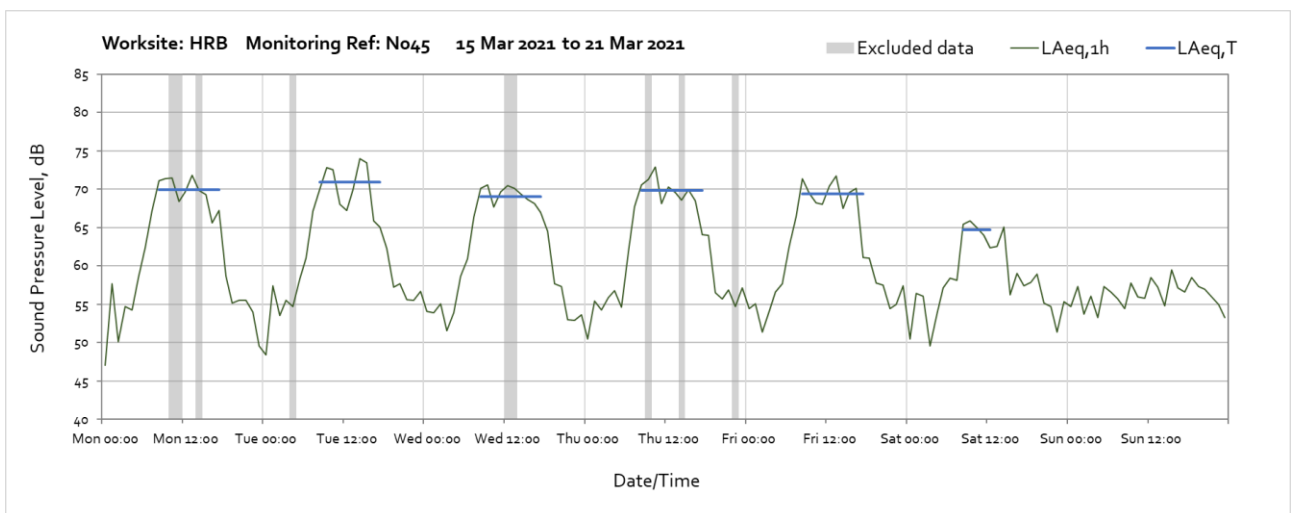
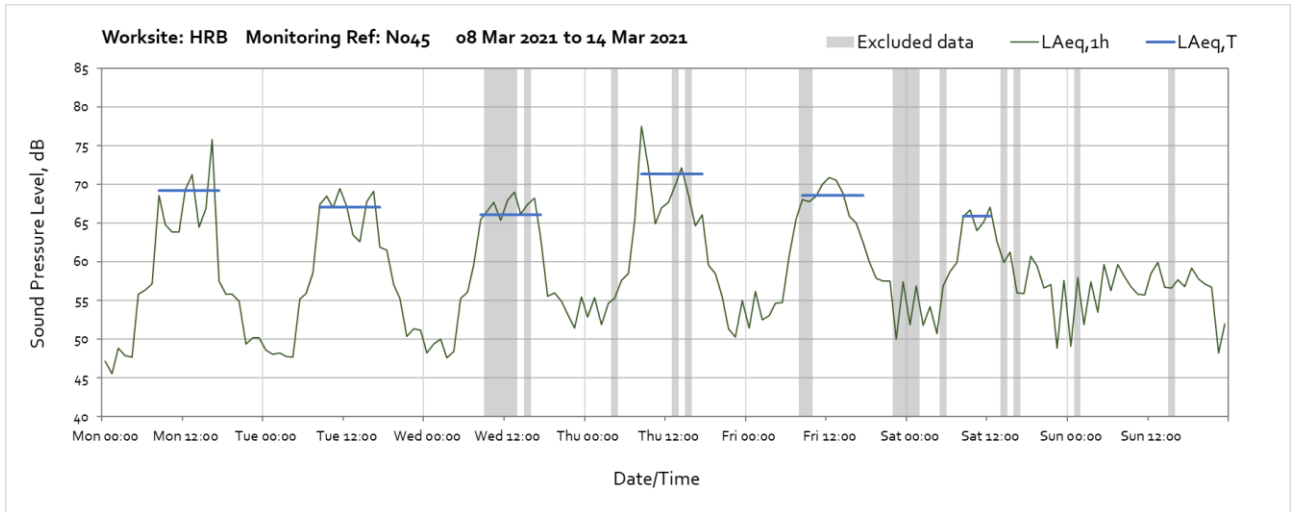


Note: Missing data between 01:00 and 02:00 on Sunday 28th March was due to the clock change (start of BST).

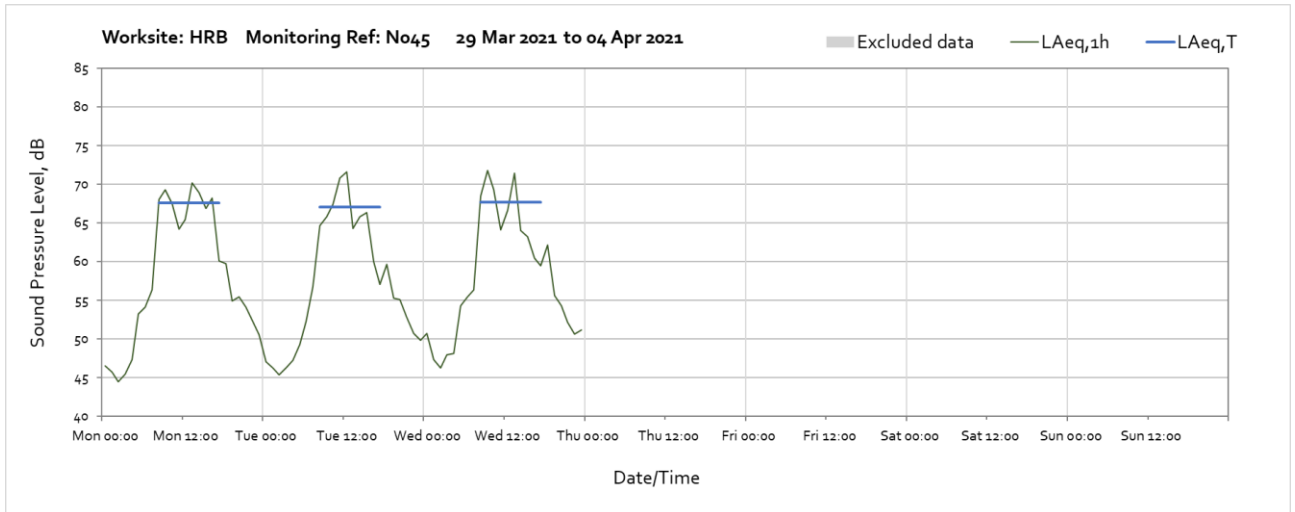


Worksite: HRB – Monitoring Ref: N045

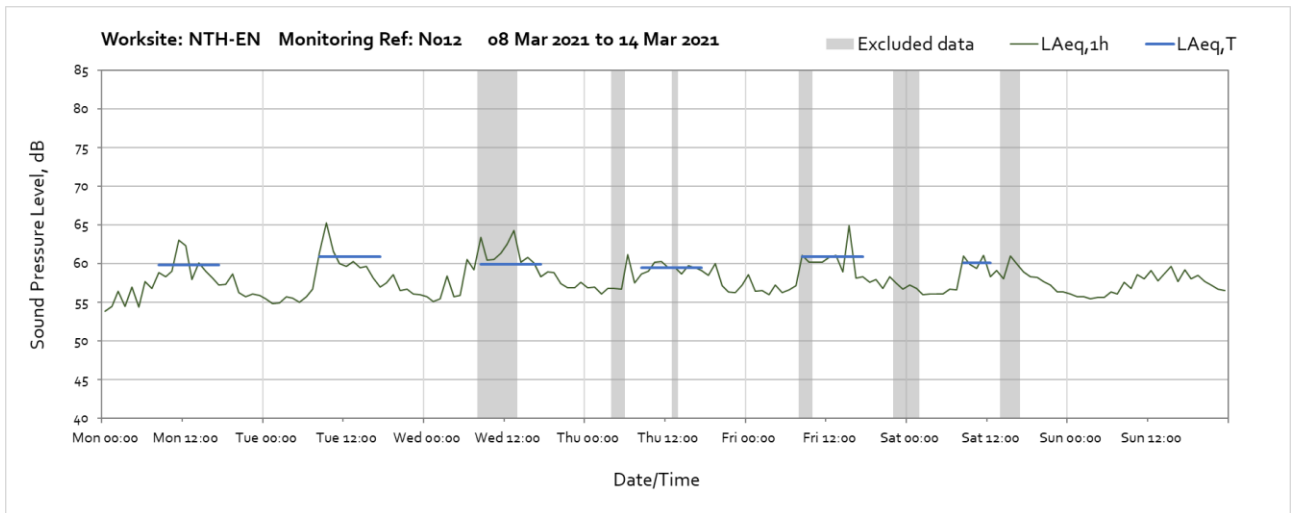
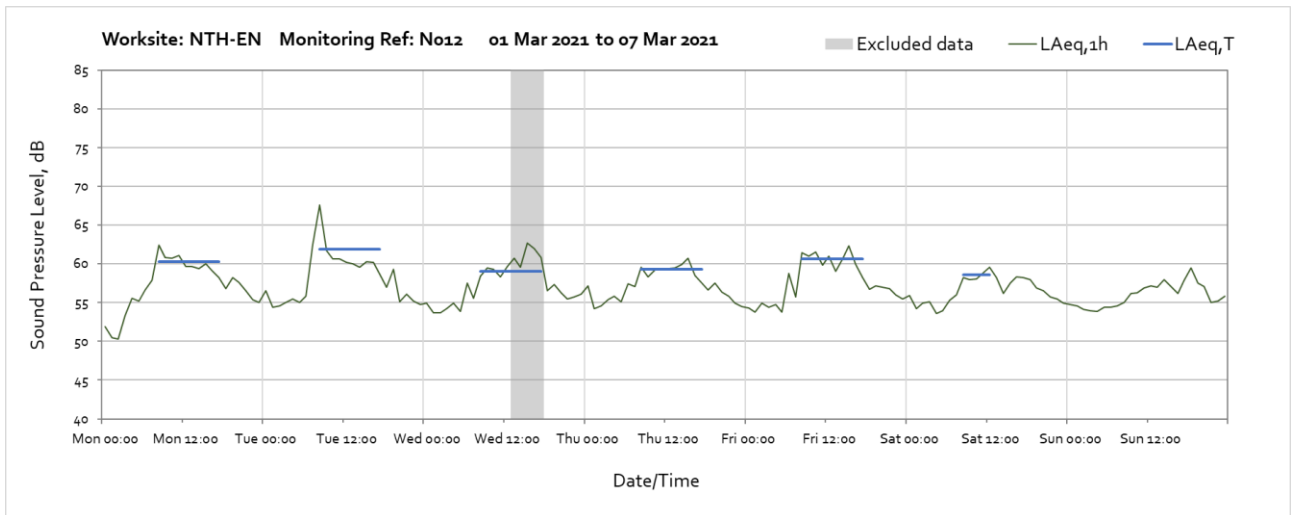


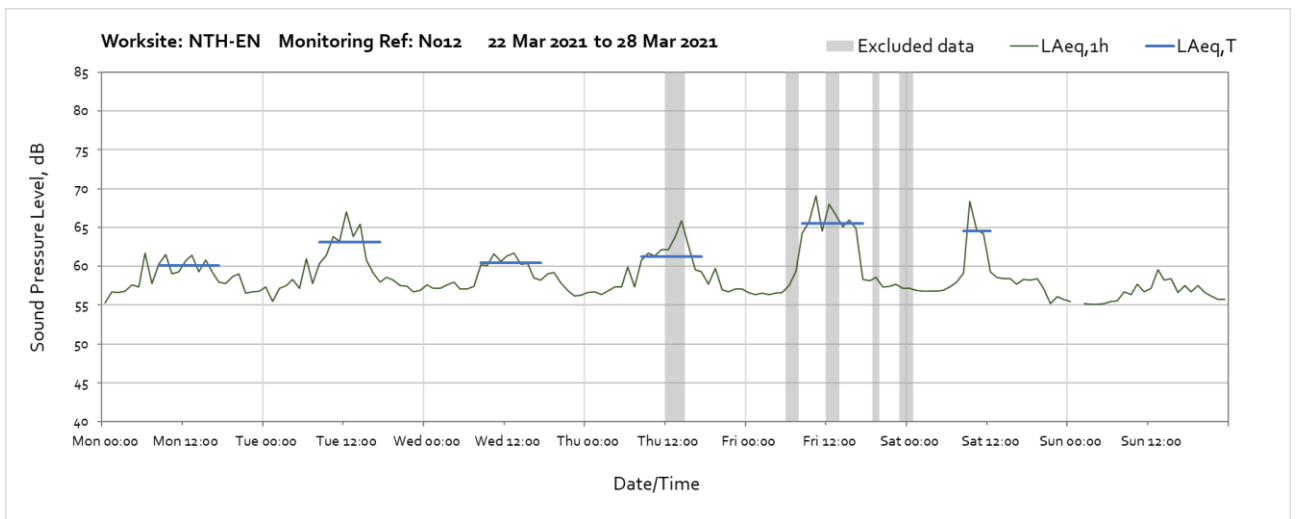
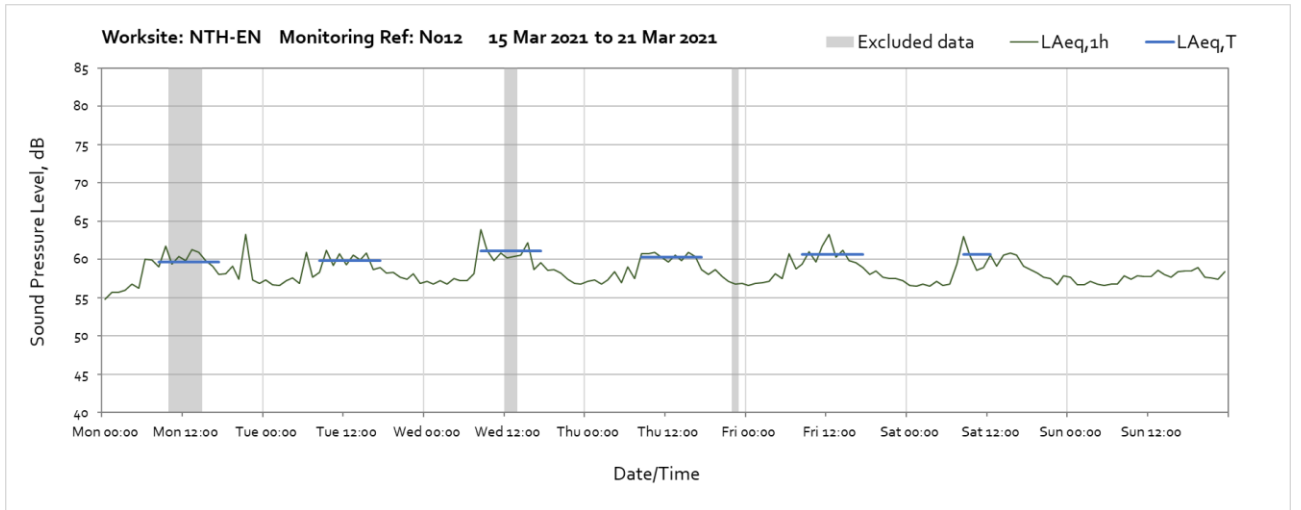


Note: Missing data between 01:00 and 02:00 on Sunday 28th March was due to the clock change (start of BST).

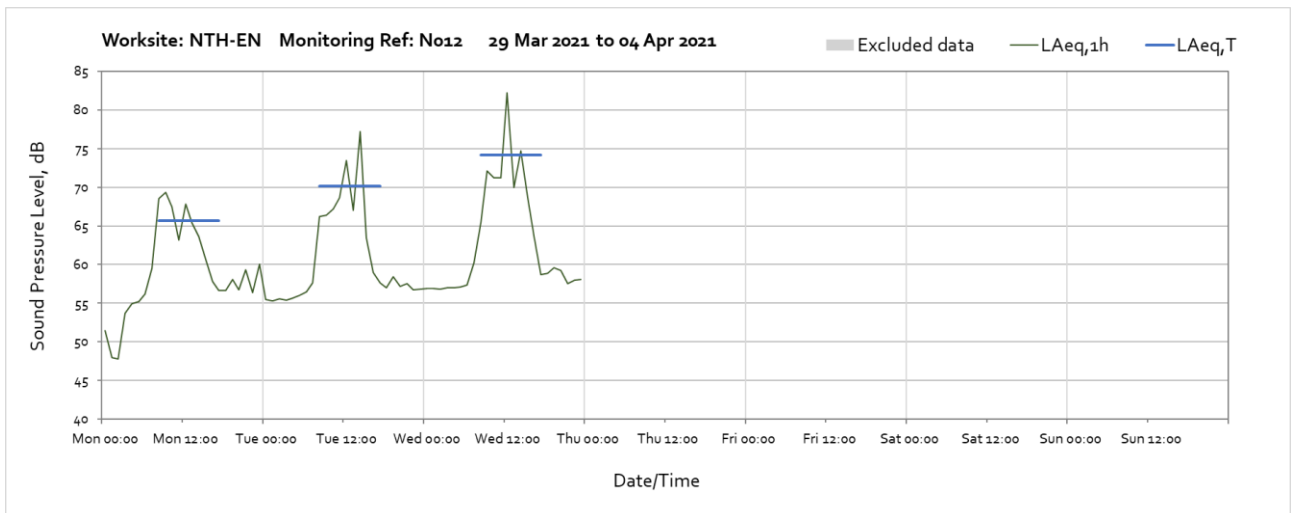


Worksite: NTH-EN – Monitoring Ref: N012

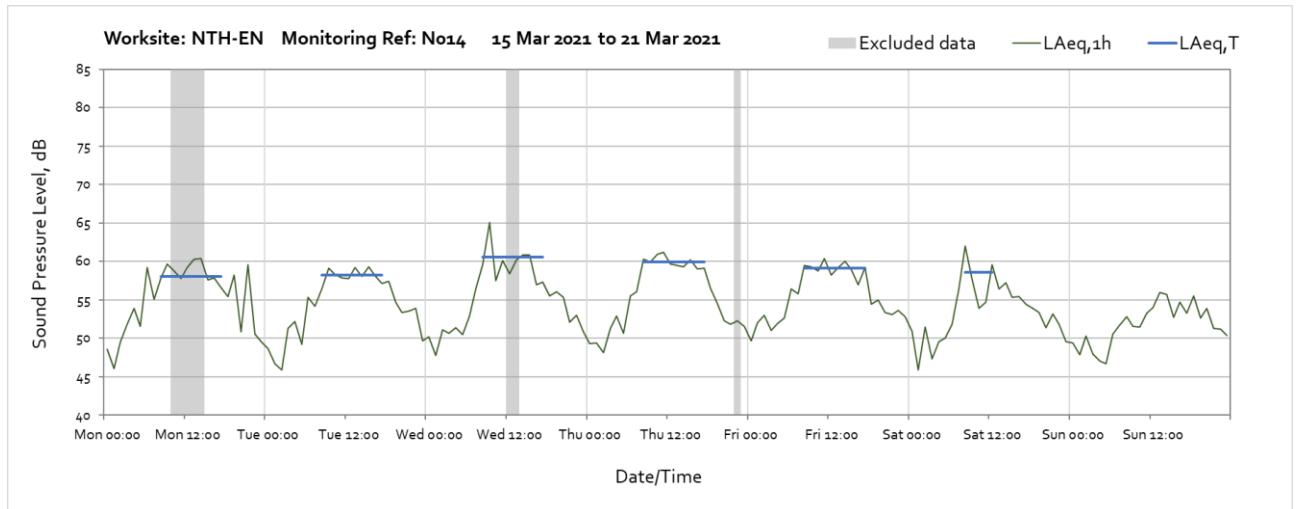
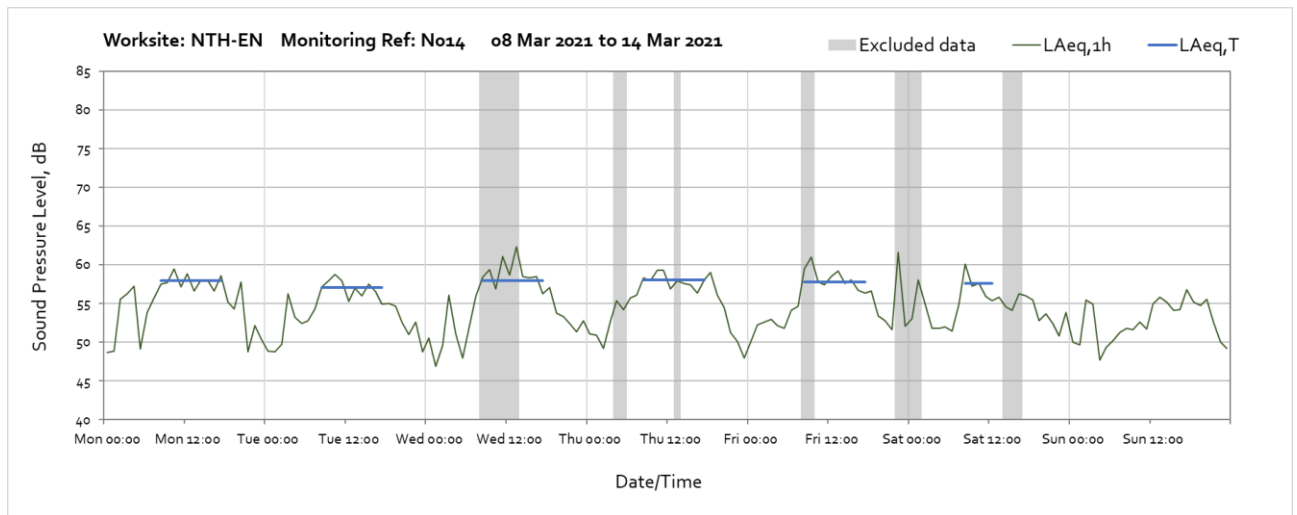
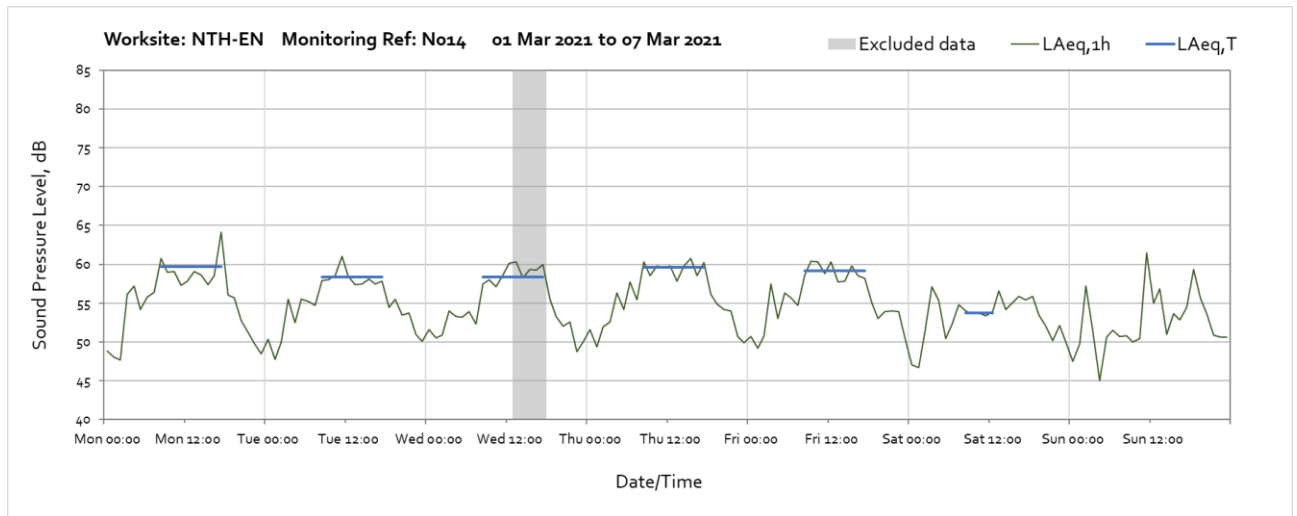




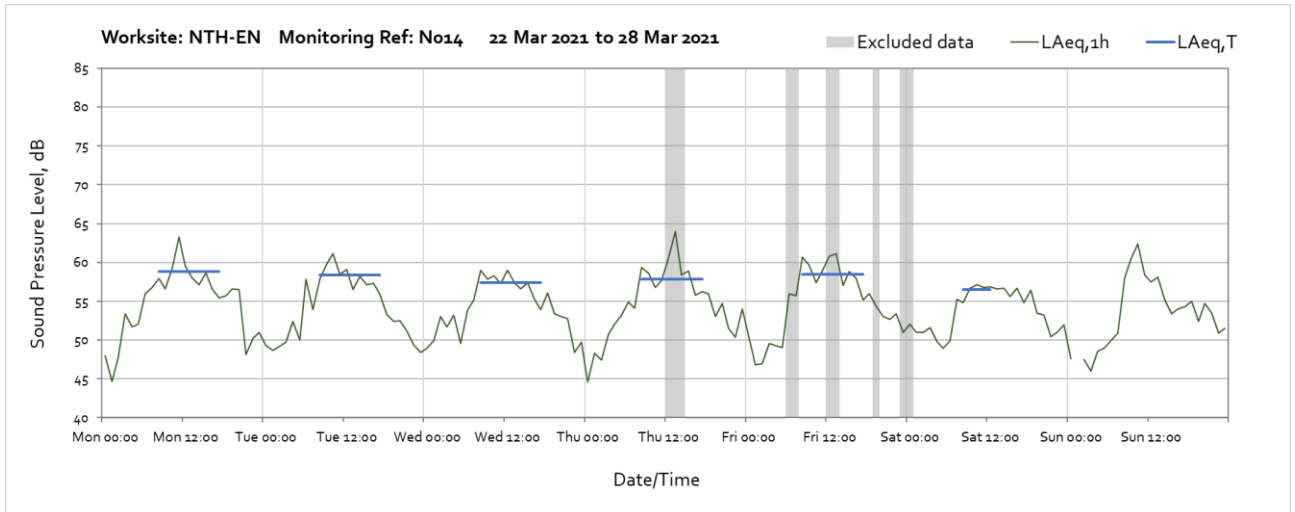
Note: Missing data between 01:00 and 02:00 on Sunday 28th March was due to the clock change (start of BST).



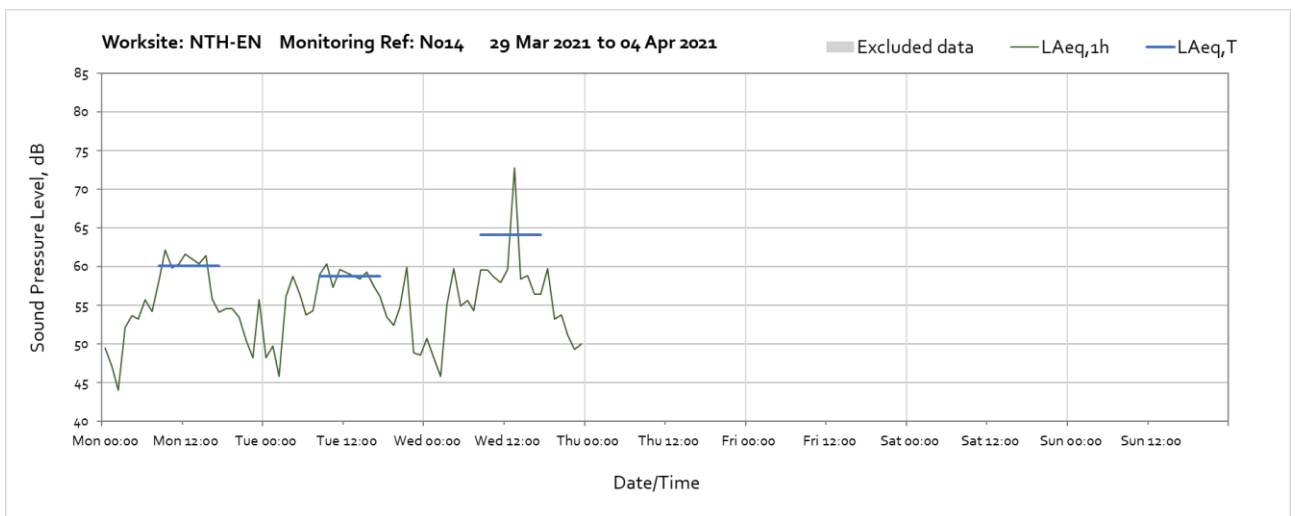
Worksite: NTH-EN – Monitoring Ref: N014



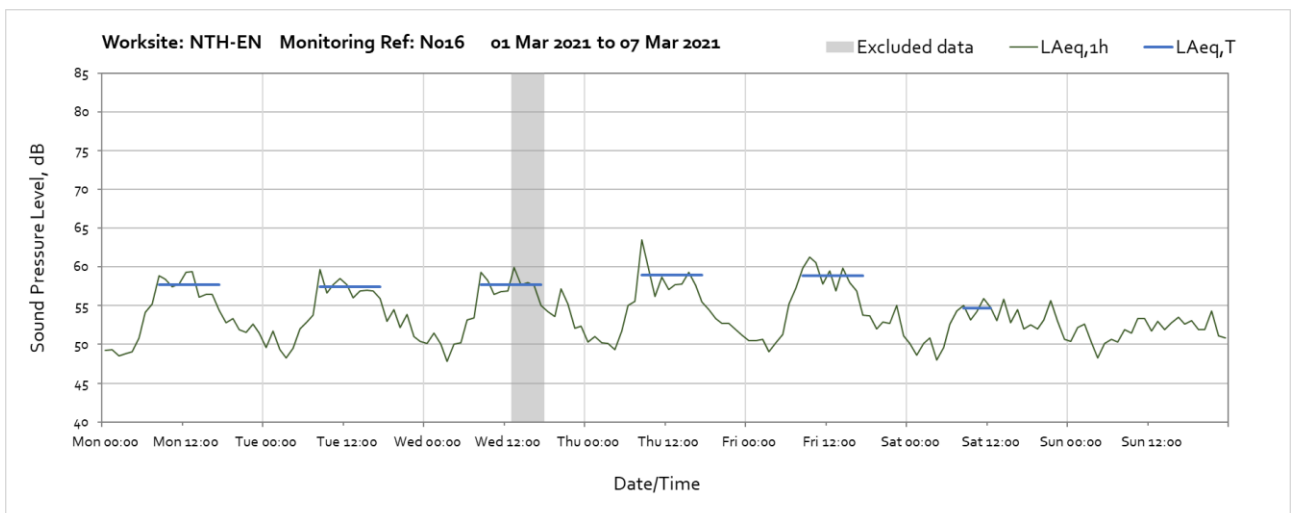
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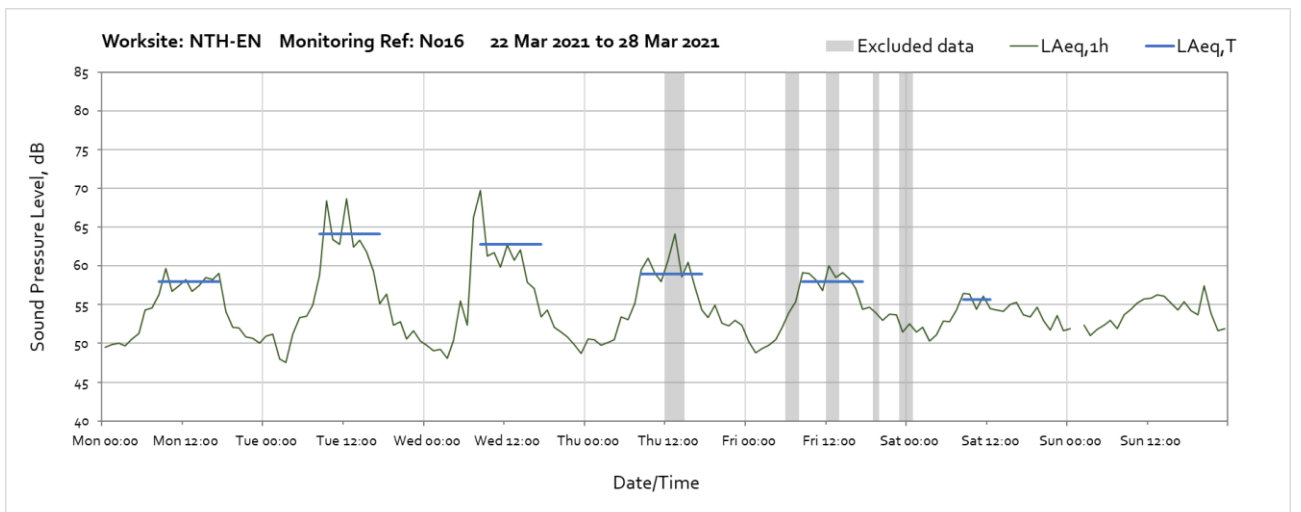
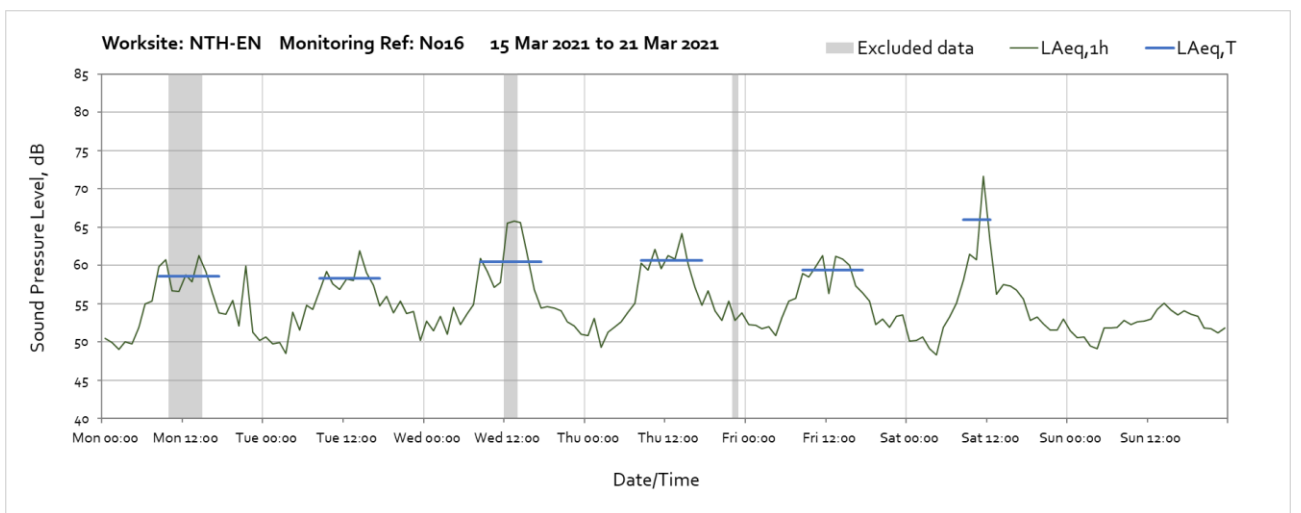
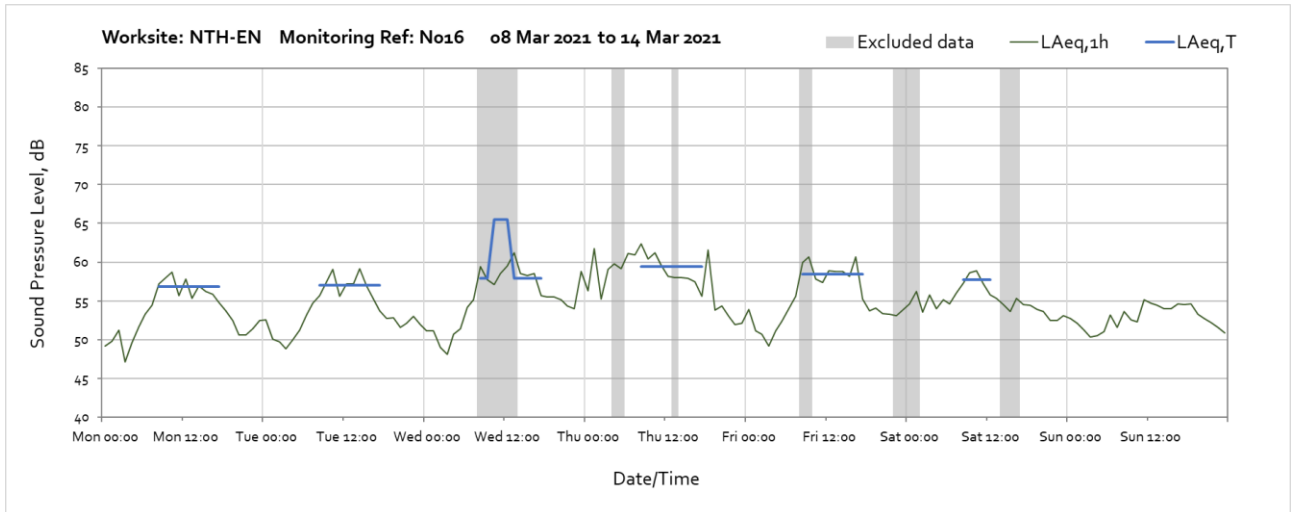


Note: Missing data between 01:00 and 02:00 on Sunday 28th March was due to the clock change (start of BST).

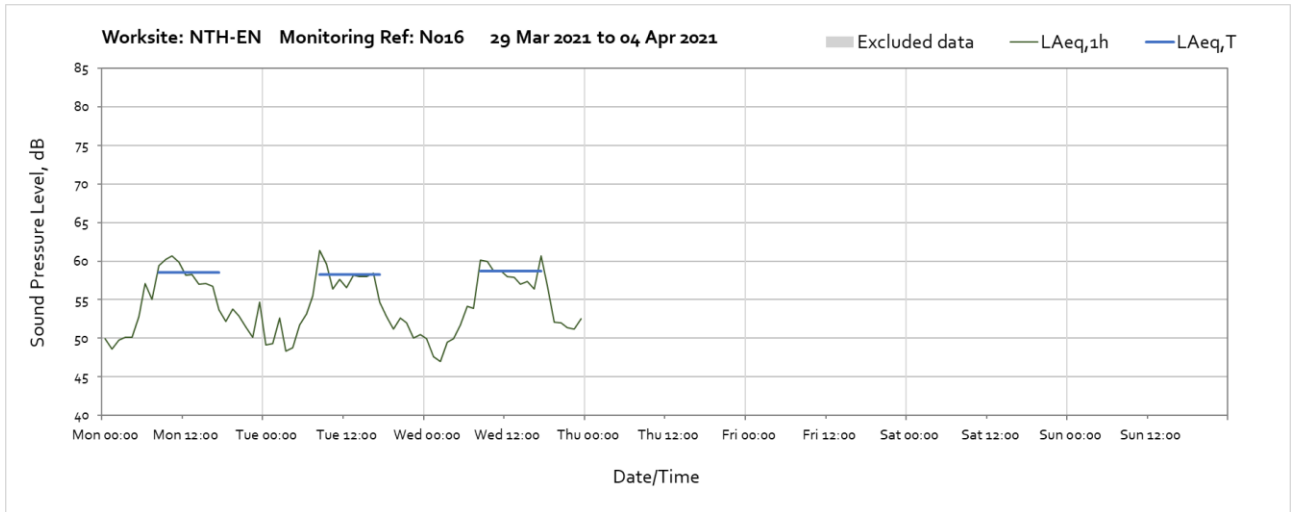


Worksite: NTH-EN – Monitoring Ref: N016

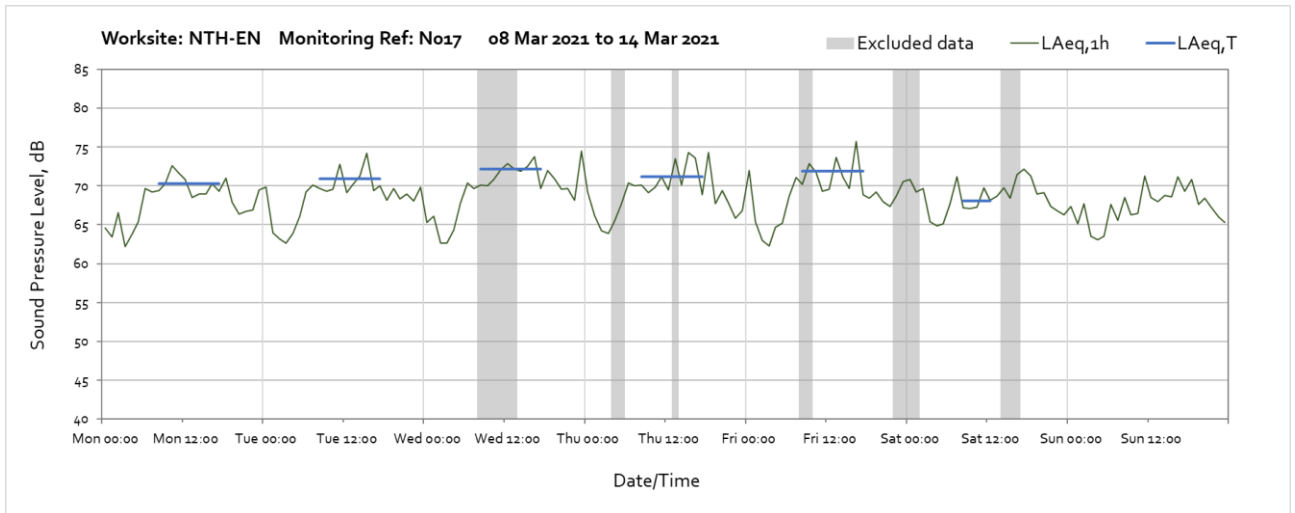
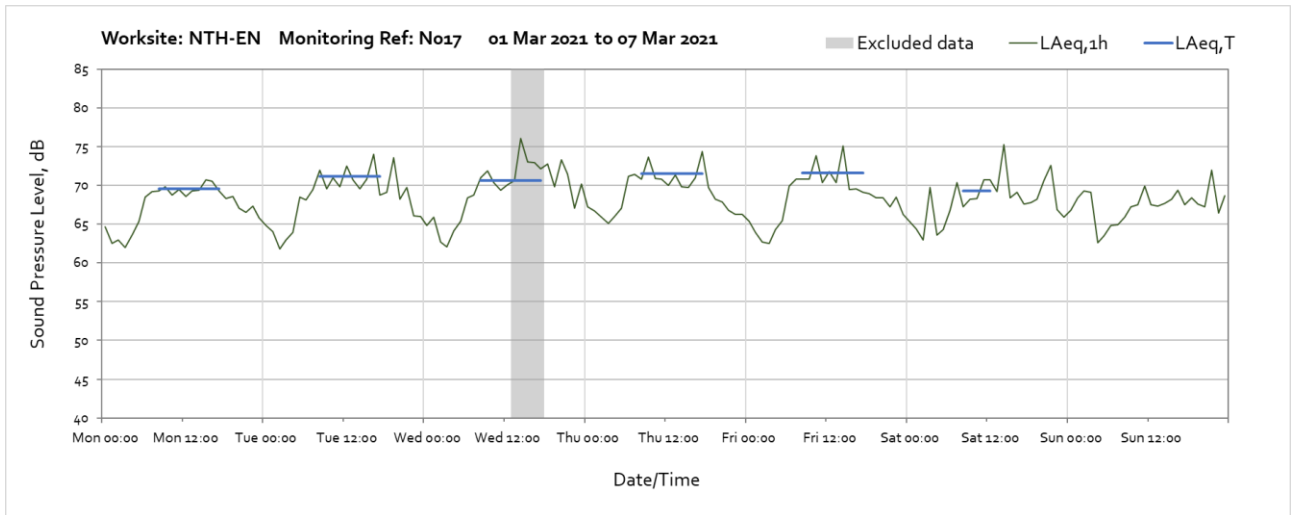


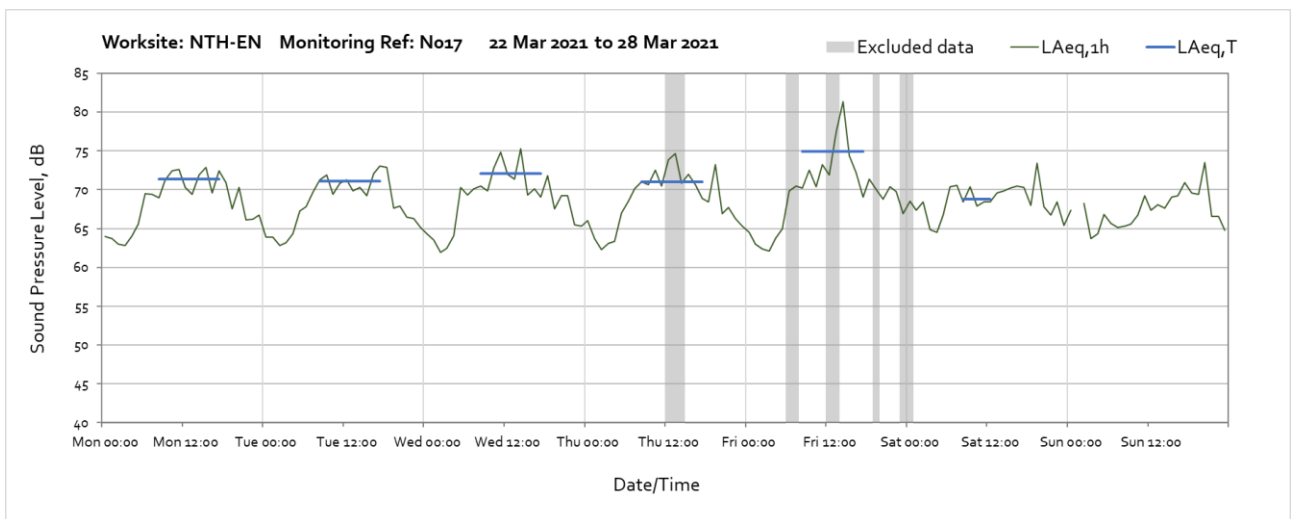
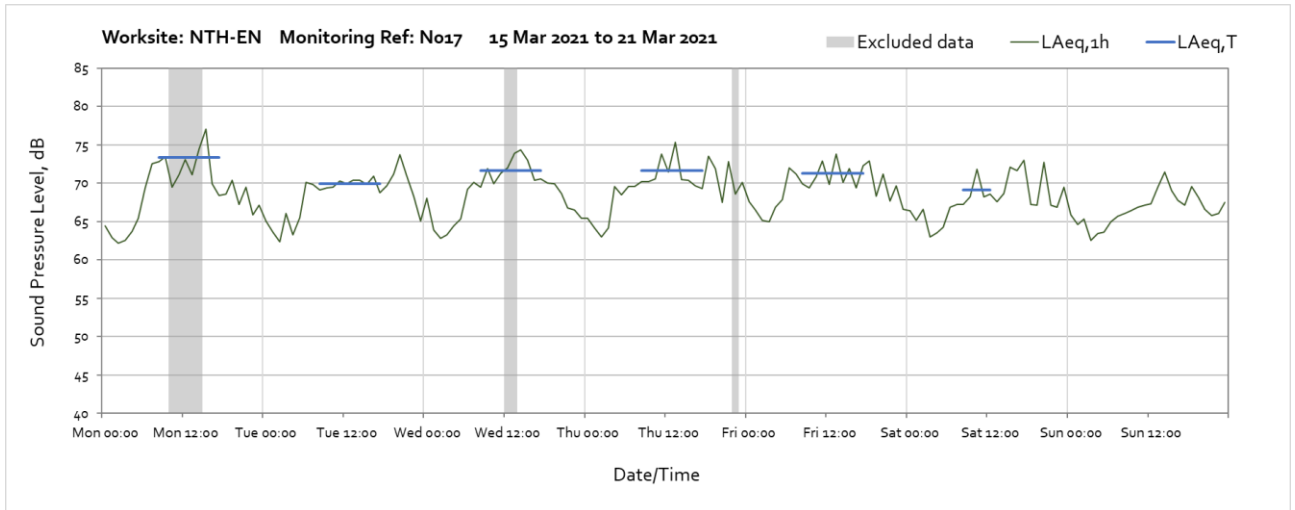


Note: Missing data between 01:00 and 02:00 on Sunday 28th March was due to the clock change (start of BST).

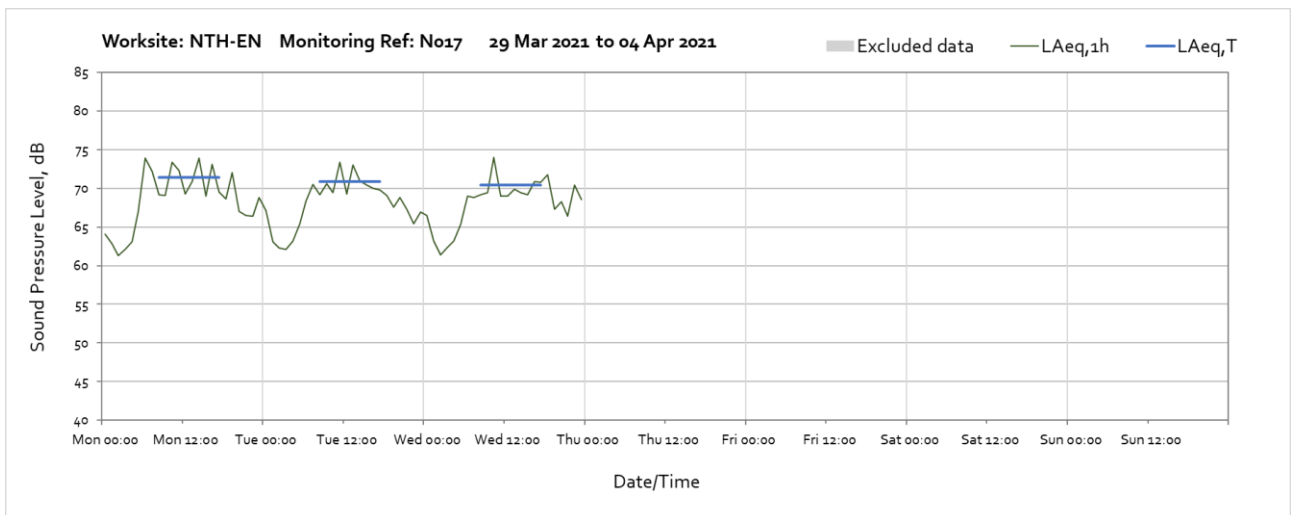


Worksite: NTH-EN – Monitoring Ref: N017

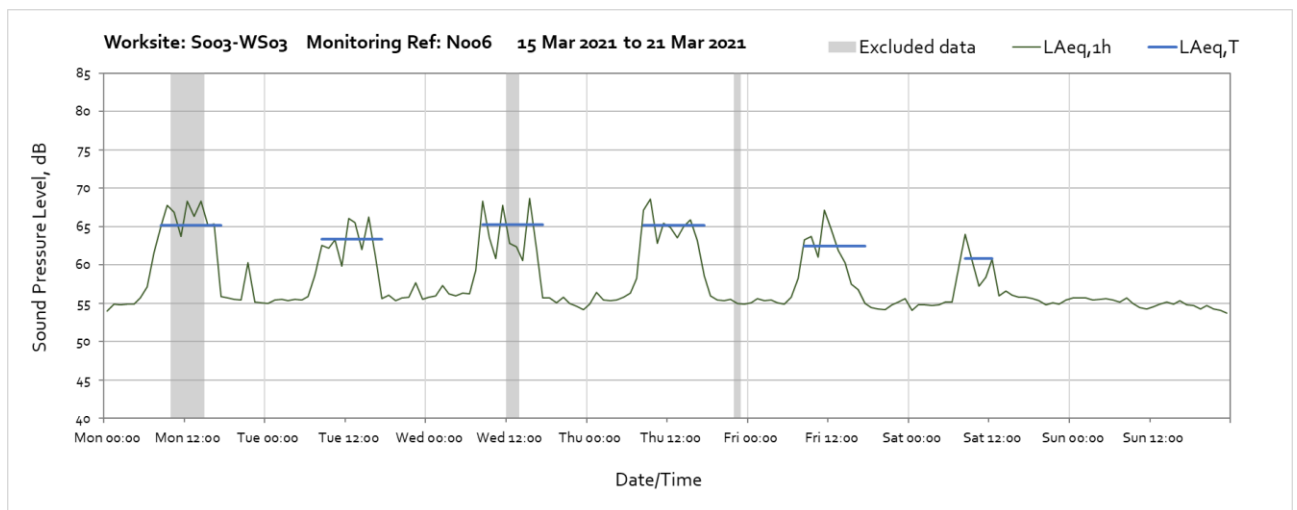
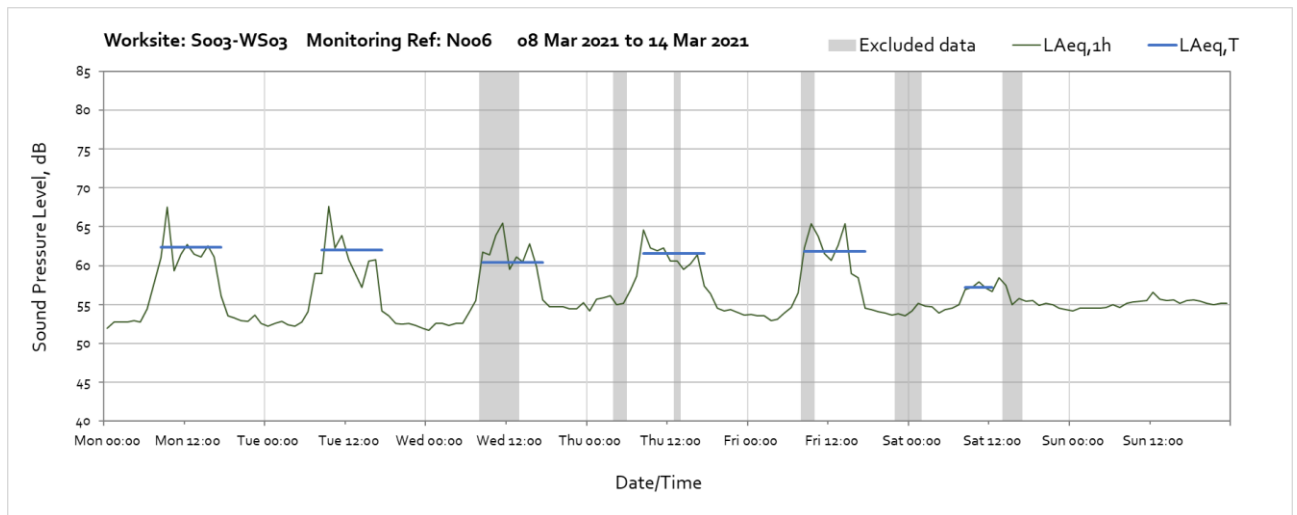
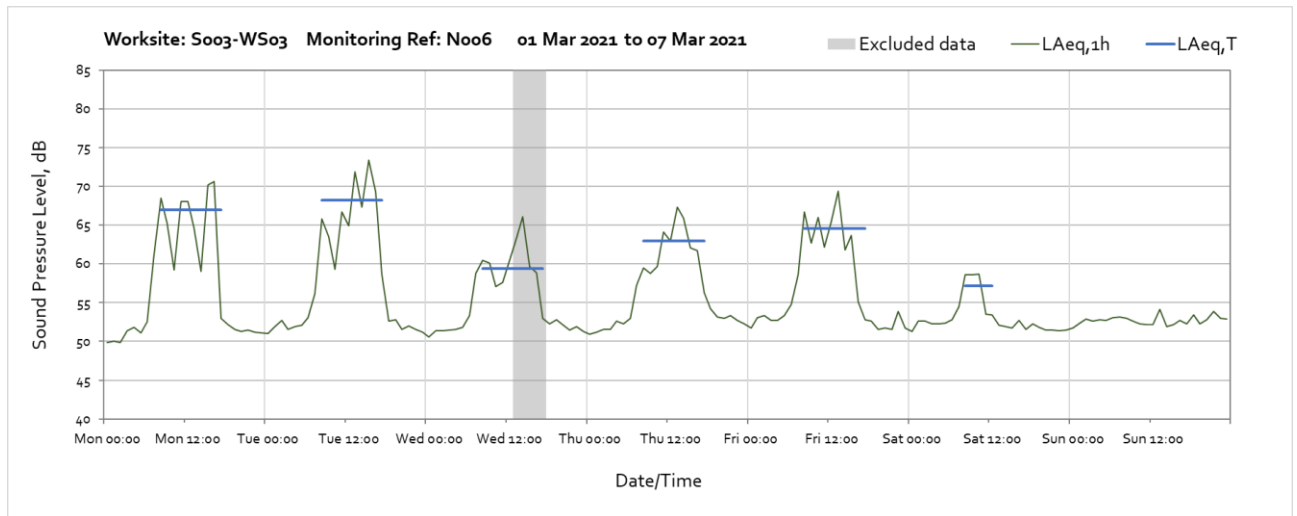




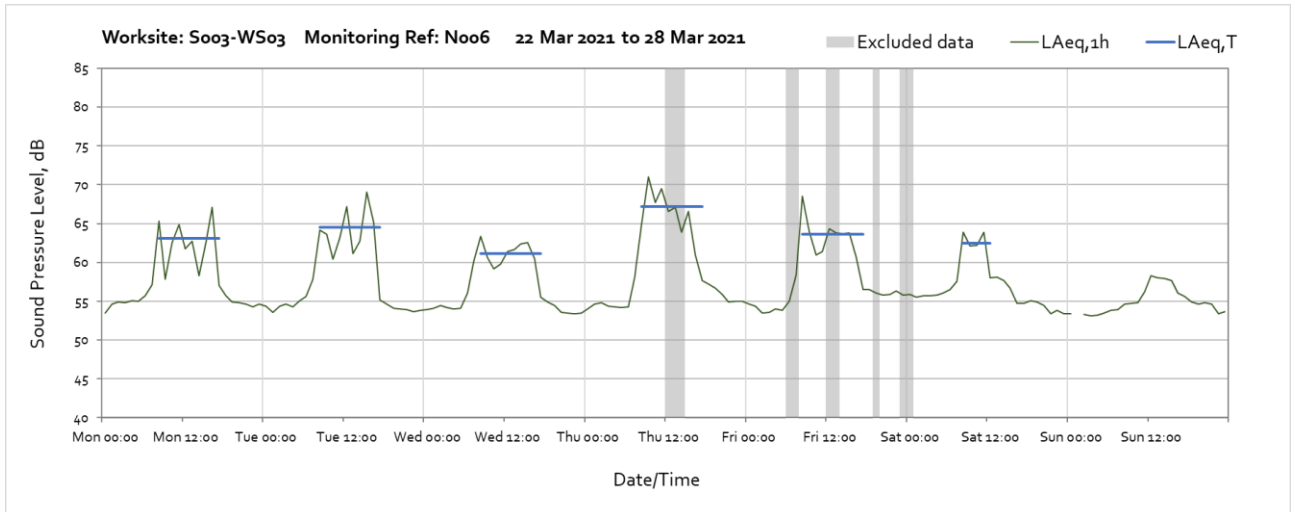
Note: Missing data between 01:00 and 02:00 on Sunday 28th March was due to the clock change (start of BST).



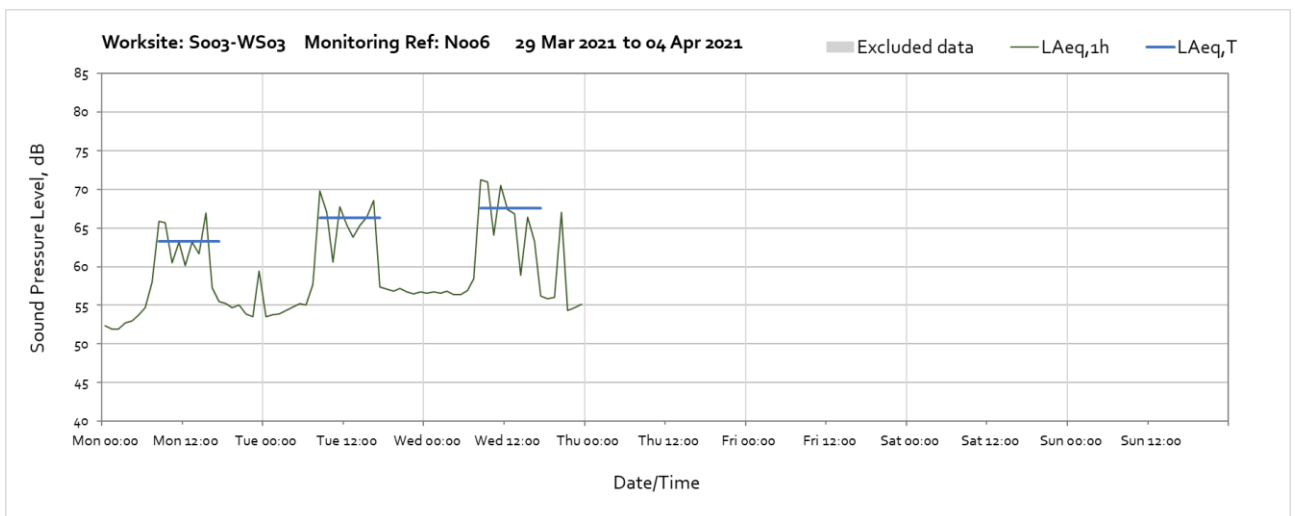
Worksite: S003-WS03 – Monitoring Ref: N006



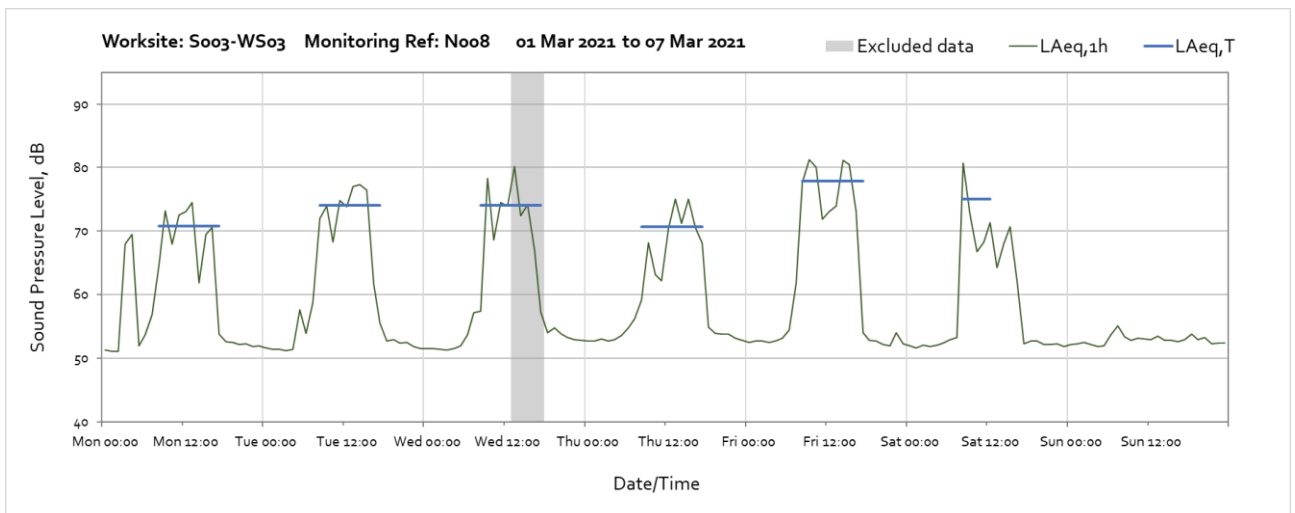
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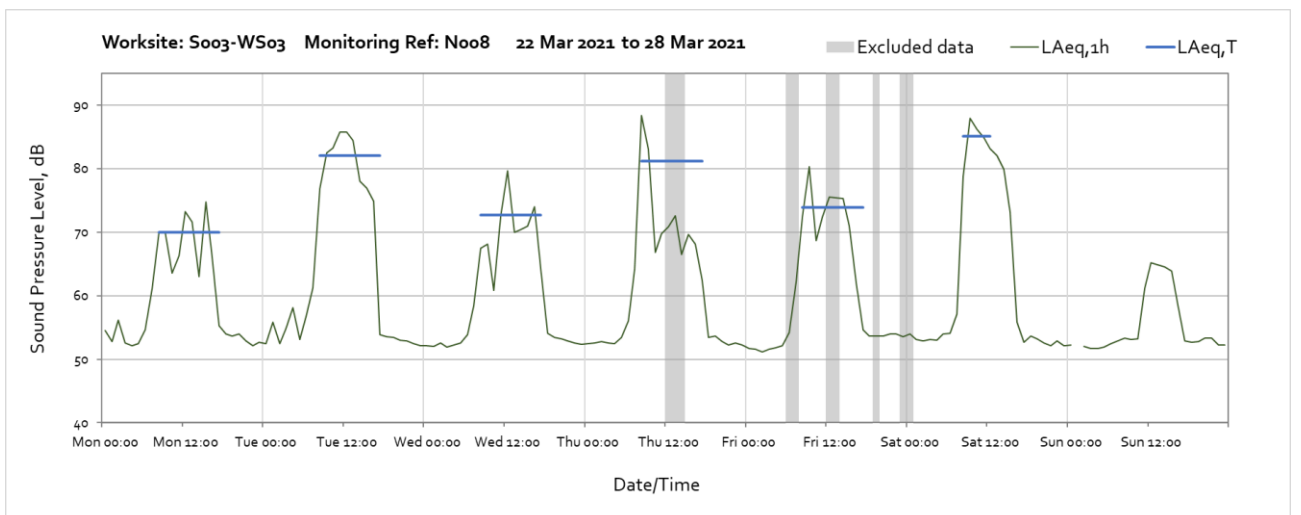
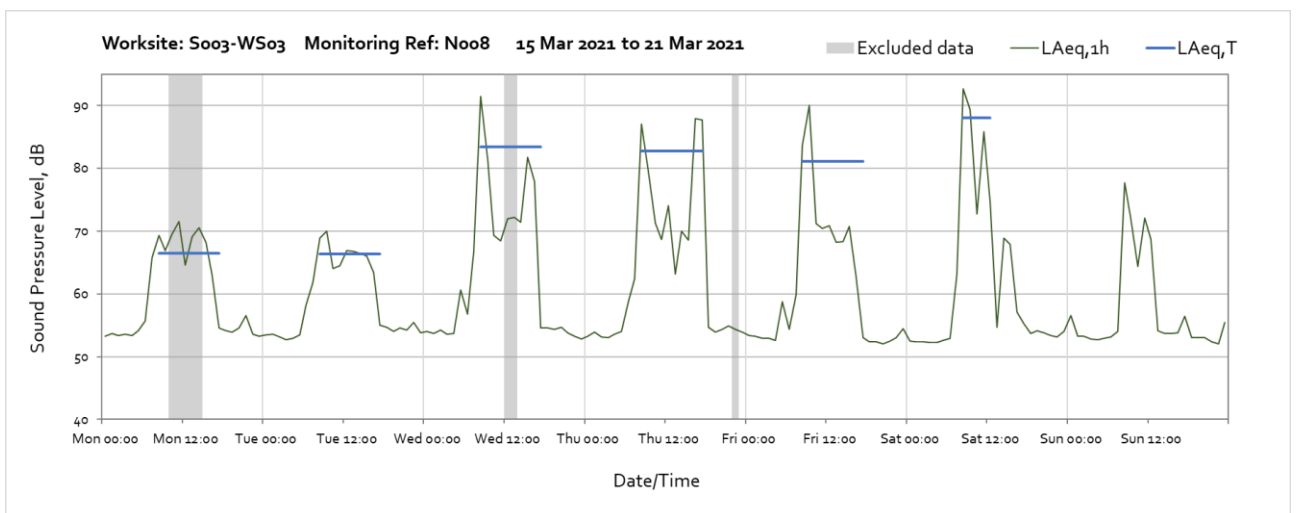
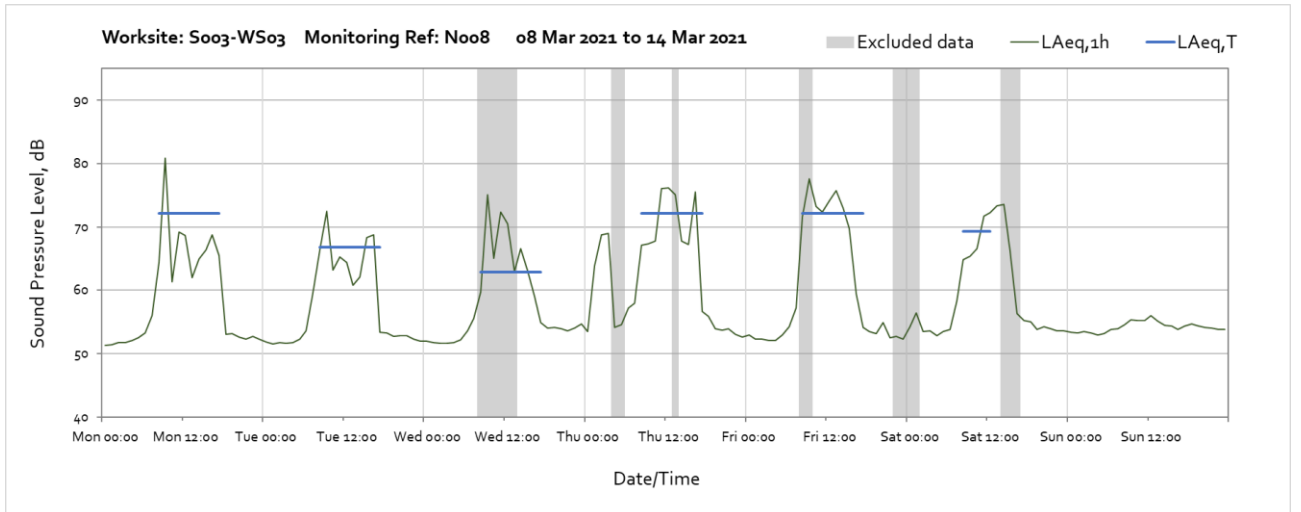


Note: Missing data between 01:00 and 02:00 on Sunday 28th March was due to the clock change (start of BST).

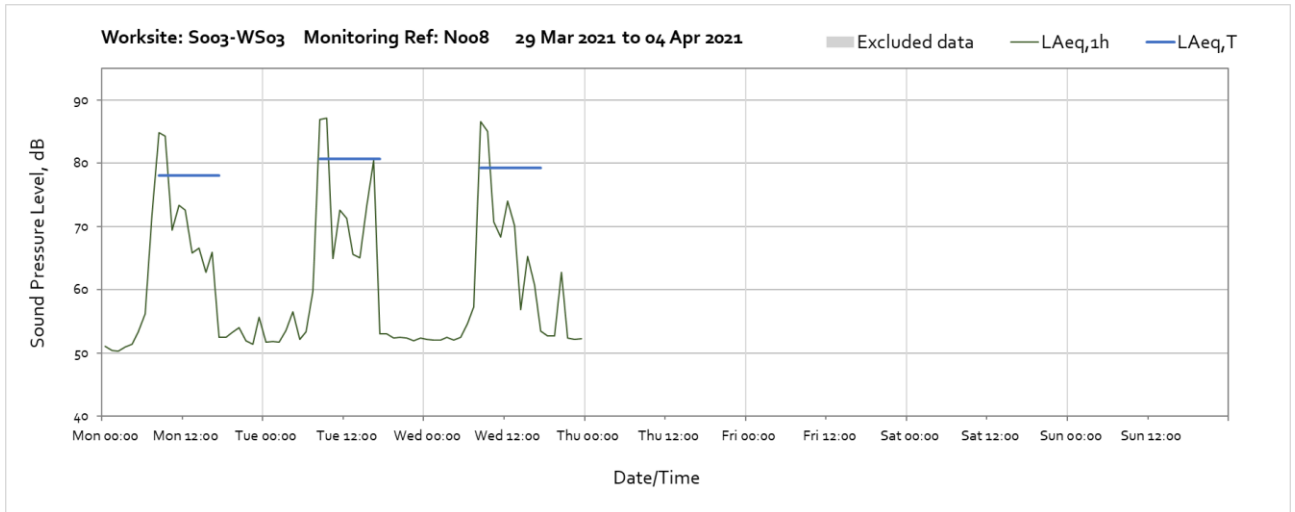


Worksite: S003-WS03 – Monitoring Ref: N008

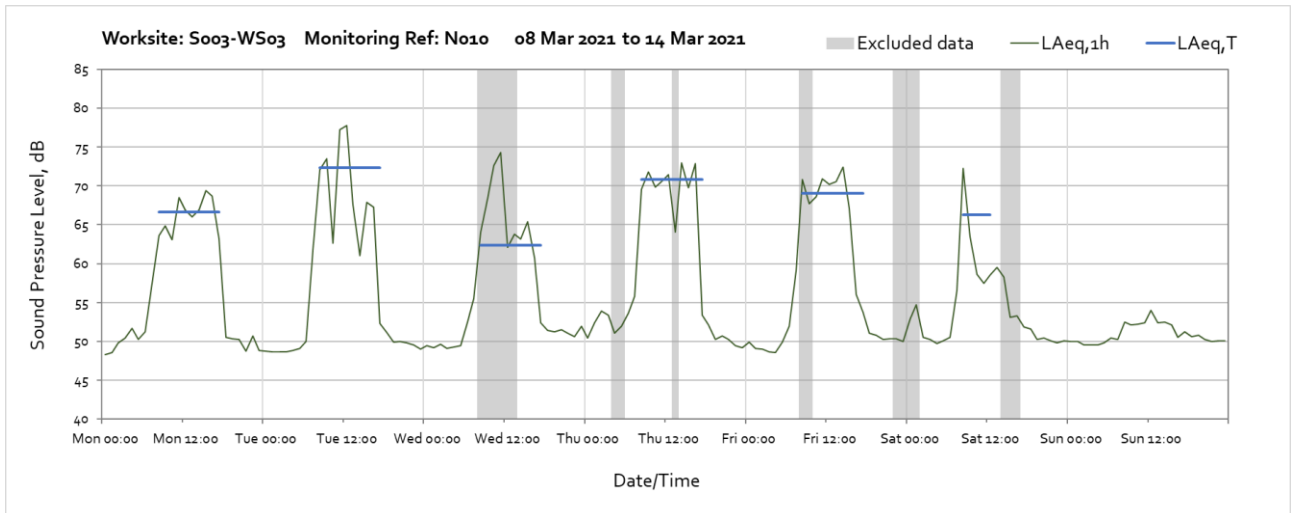
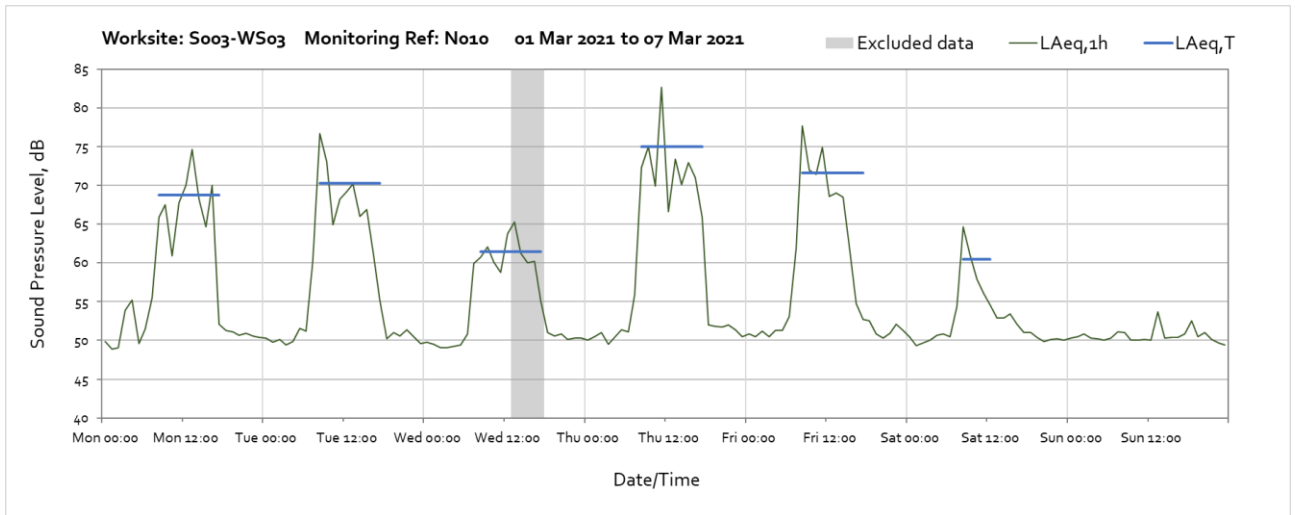


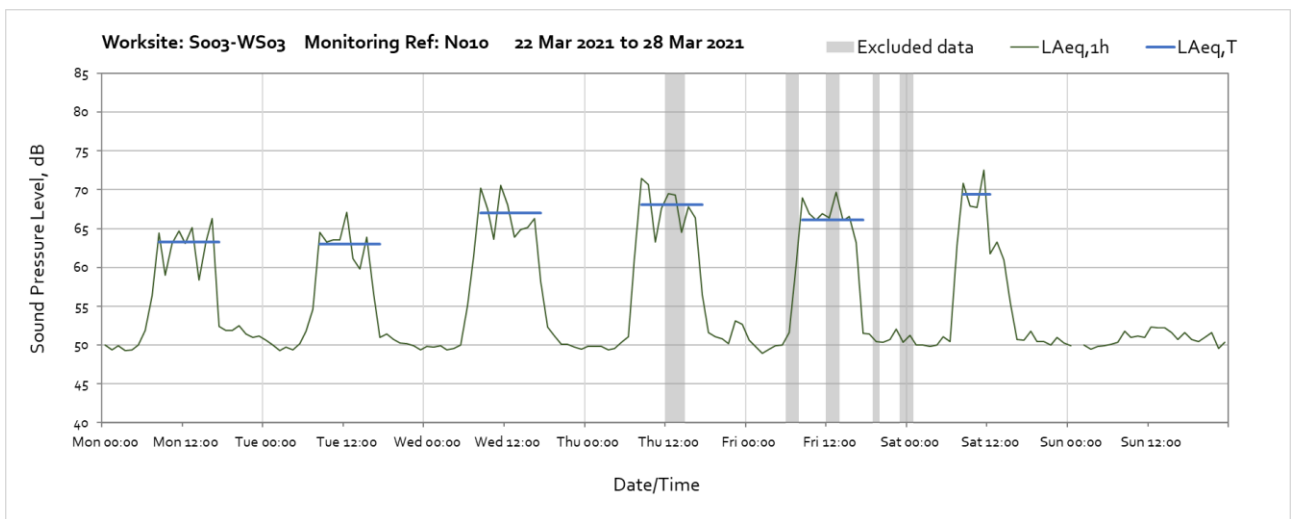
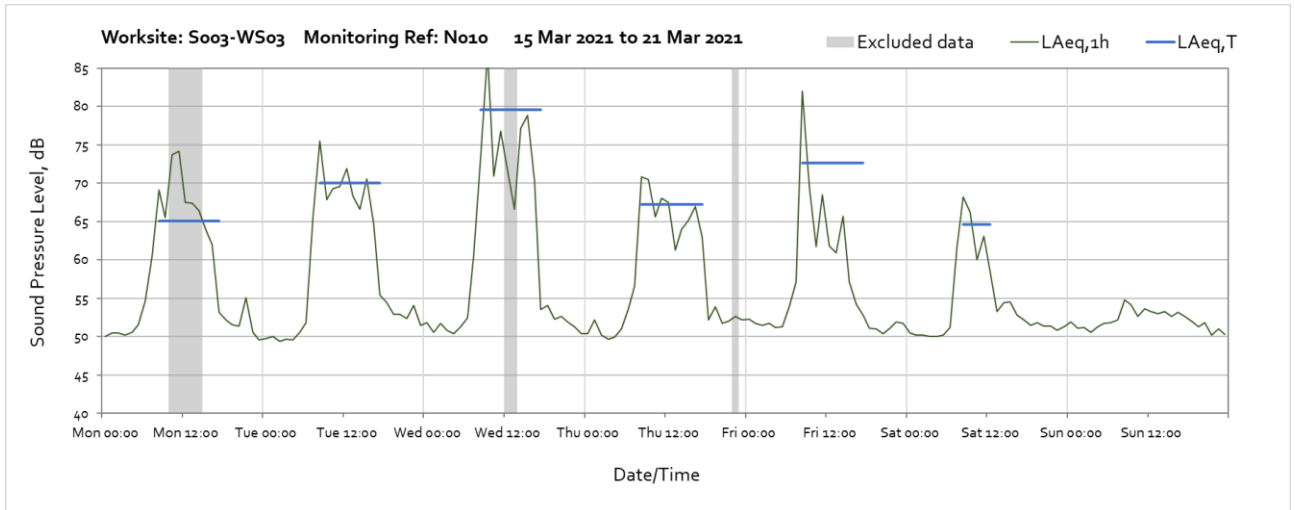


Note: Missing data between 01:00 and 02:00 on Sunday 28th March was due to the clock change (start of BST).

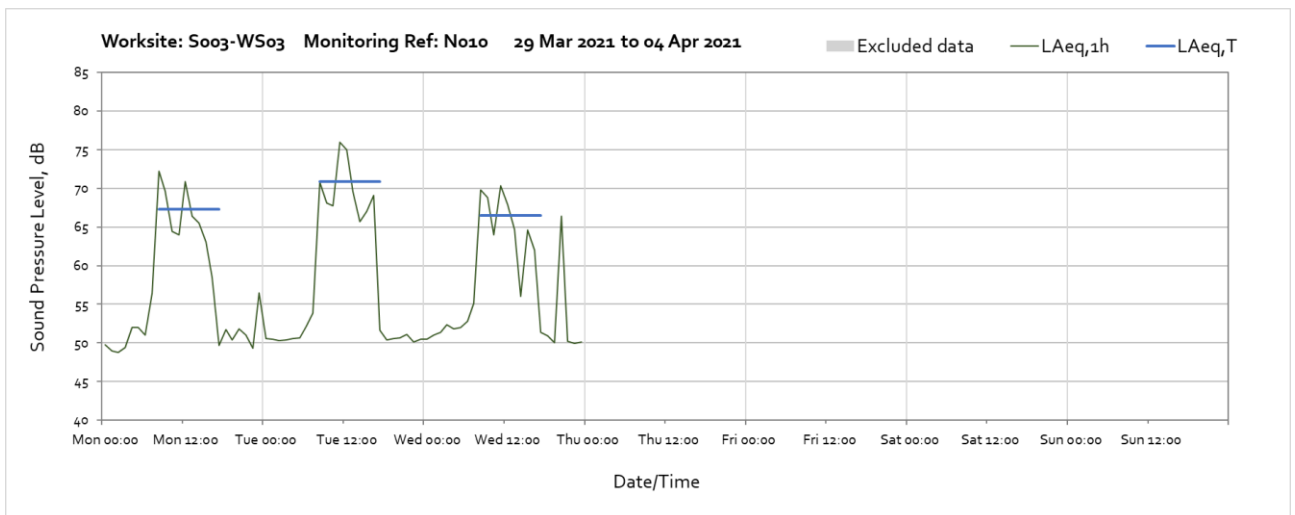


Worksite: S003-WS03 – Monitoring Ref: N010

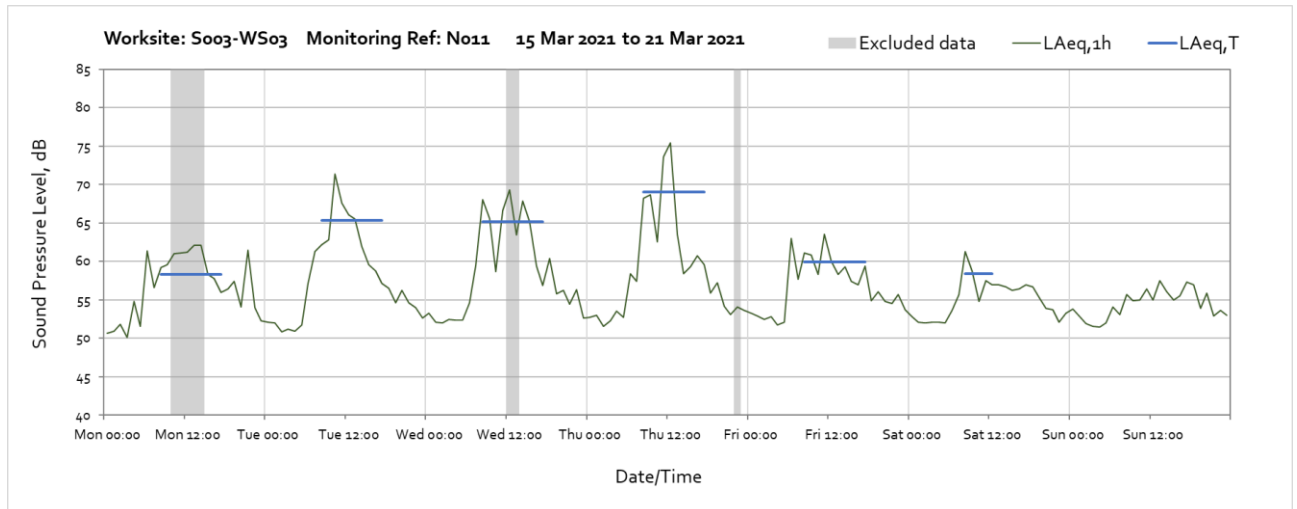
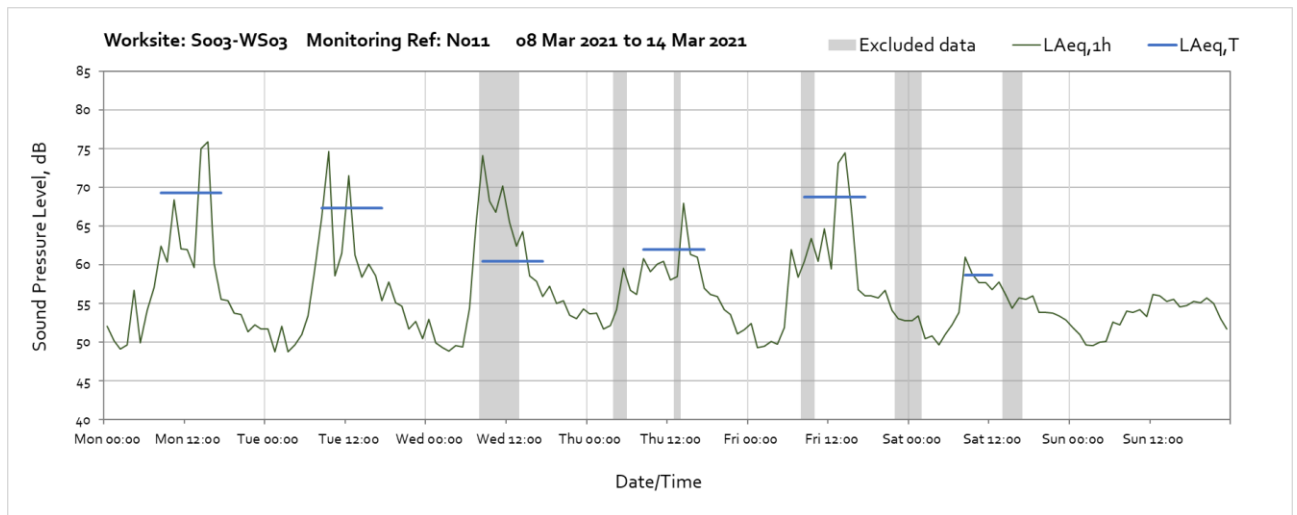
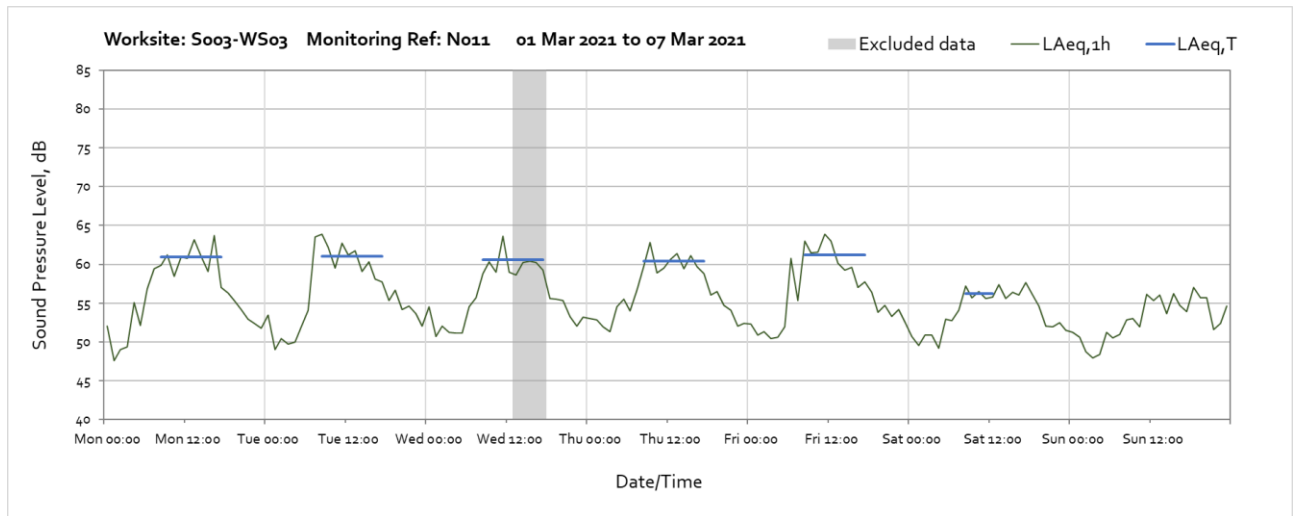




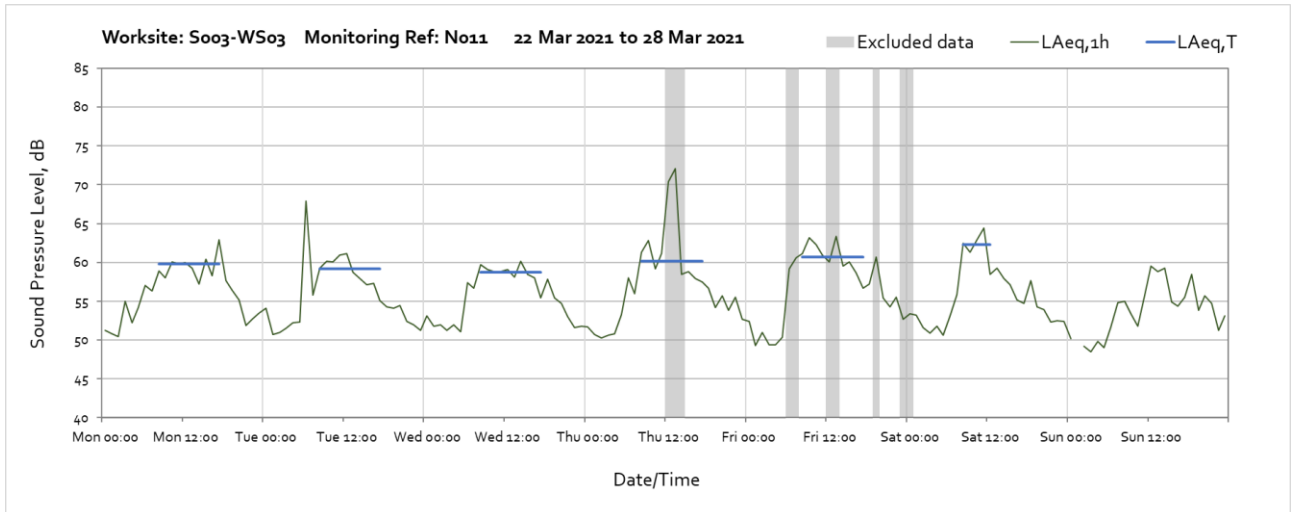
Note: Missing data between 01:00 and 02:00 on Sunday 28th March was due to the clock change (start of BST).



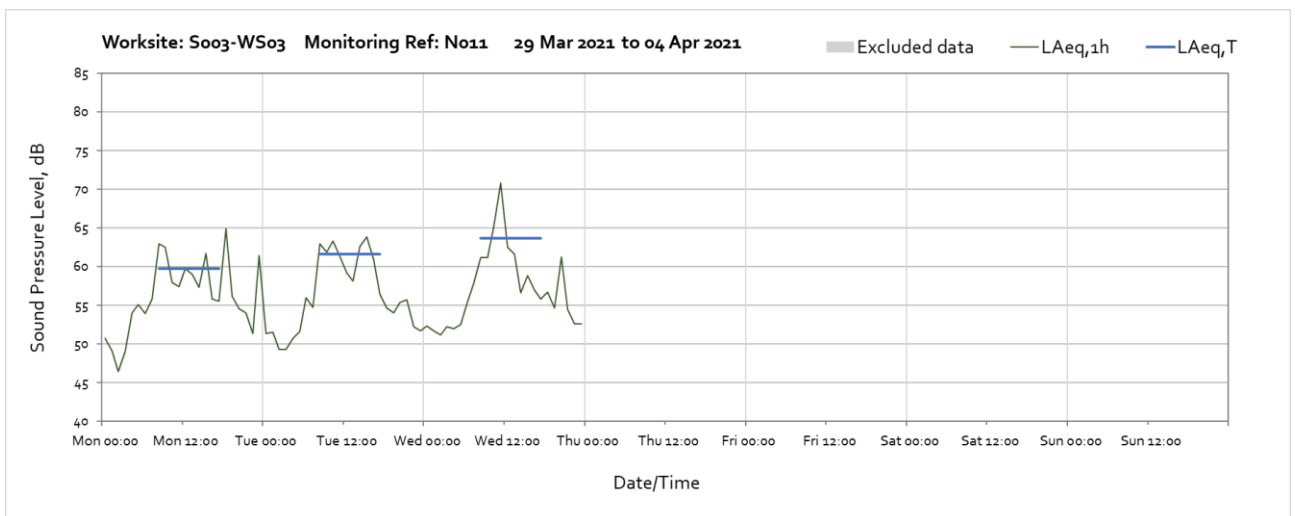
Worksite: S003-WS03 – Monitoring Ref: N011



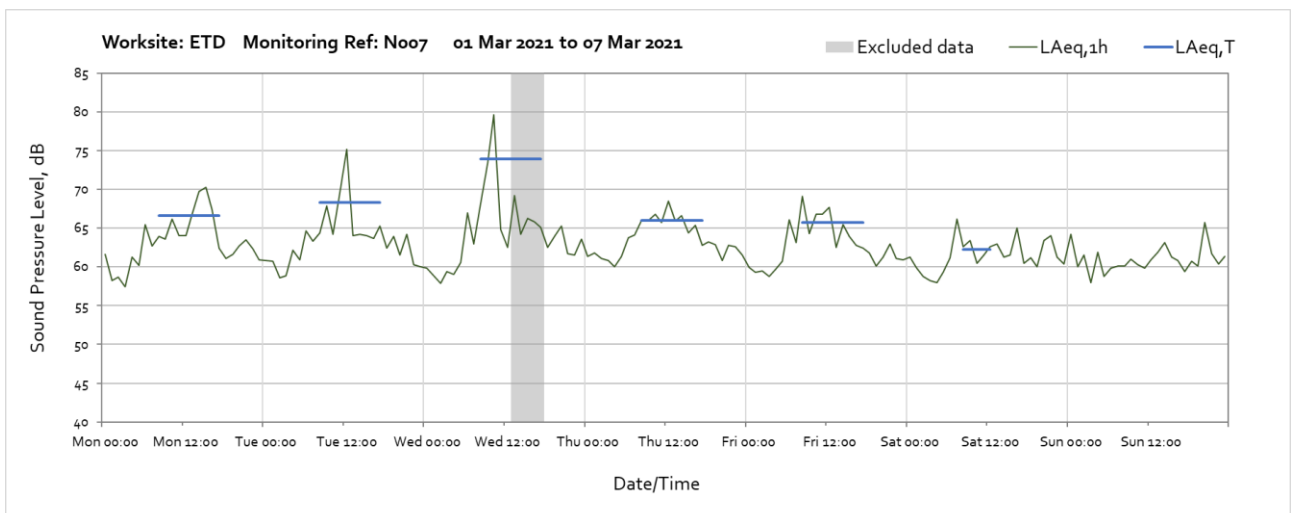
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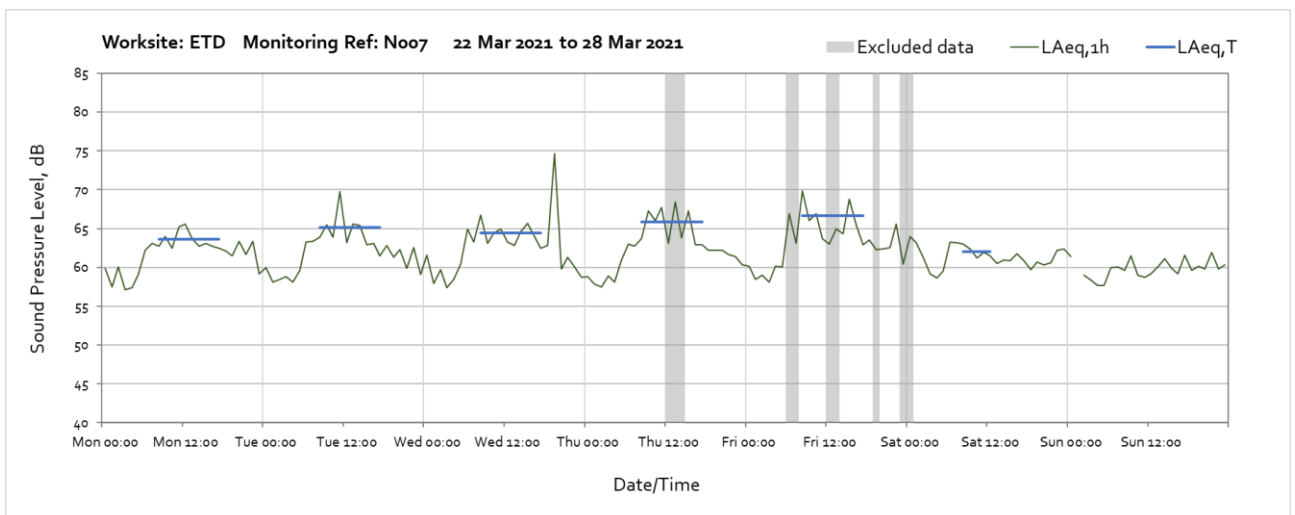
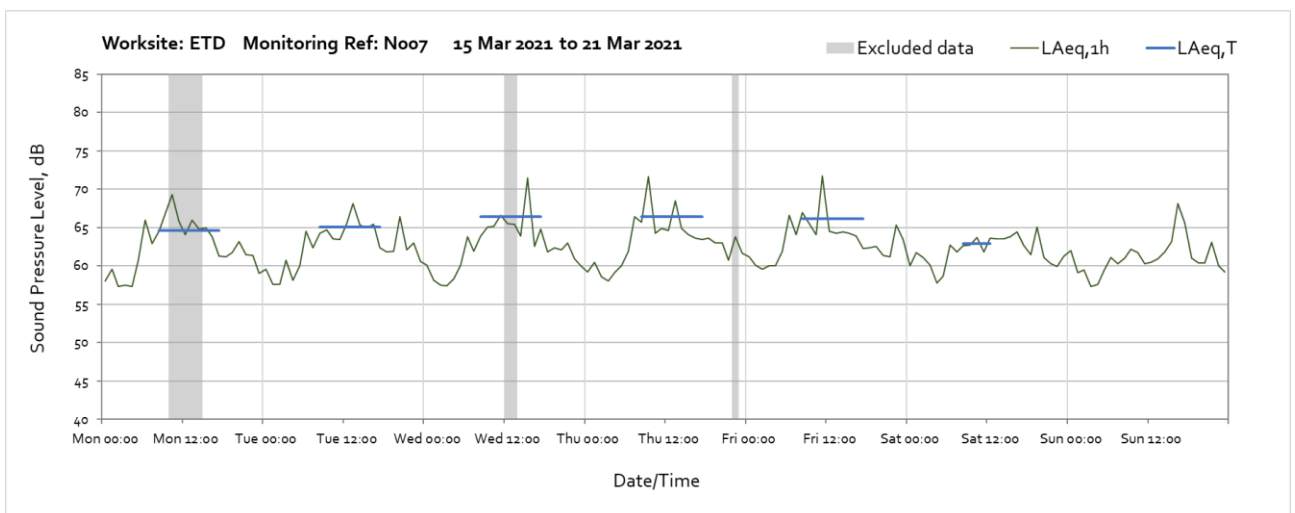
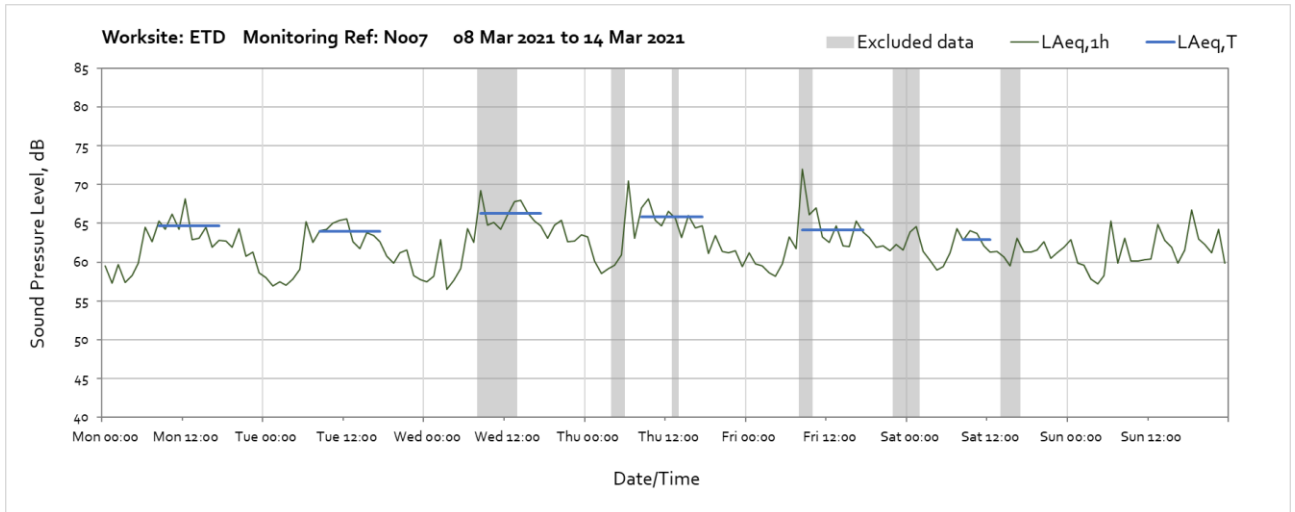


Note: Missing data between 01:00 and 02:00 on Sunday 28th March was due to the clock change (start of BST).

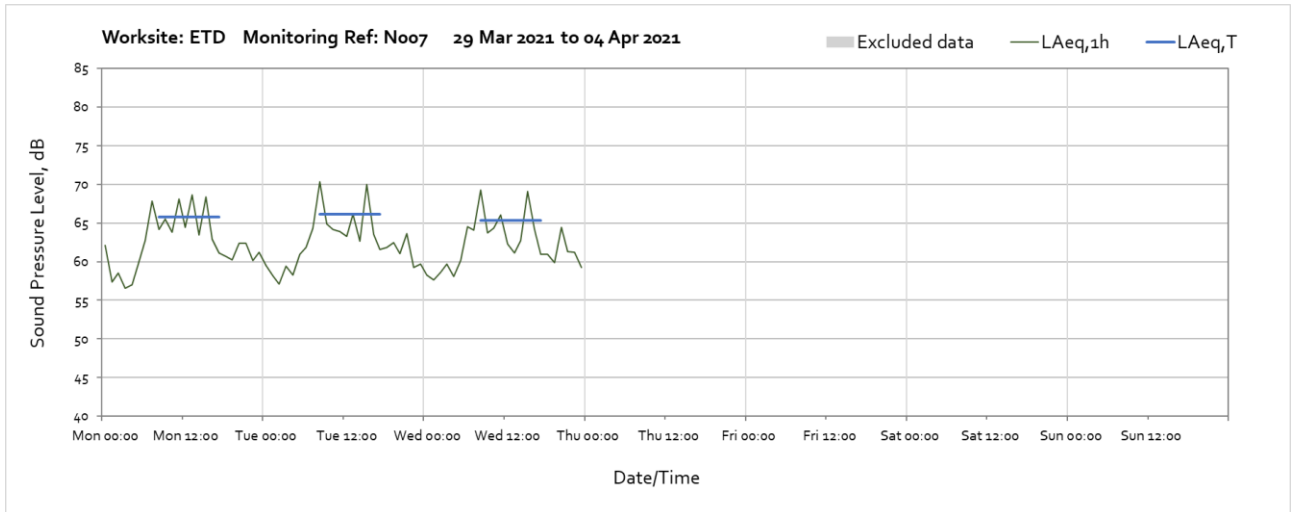


Worksite: ETD – Monitoring Ref: N007

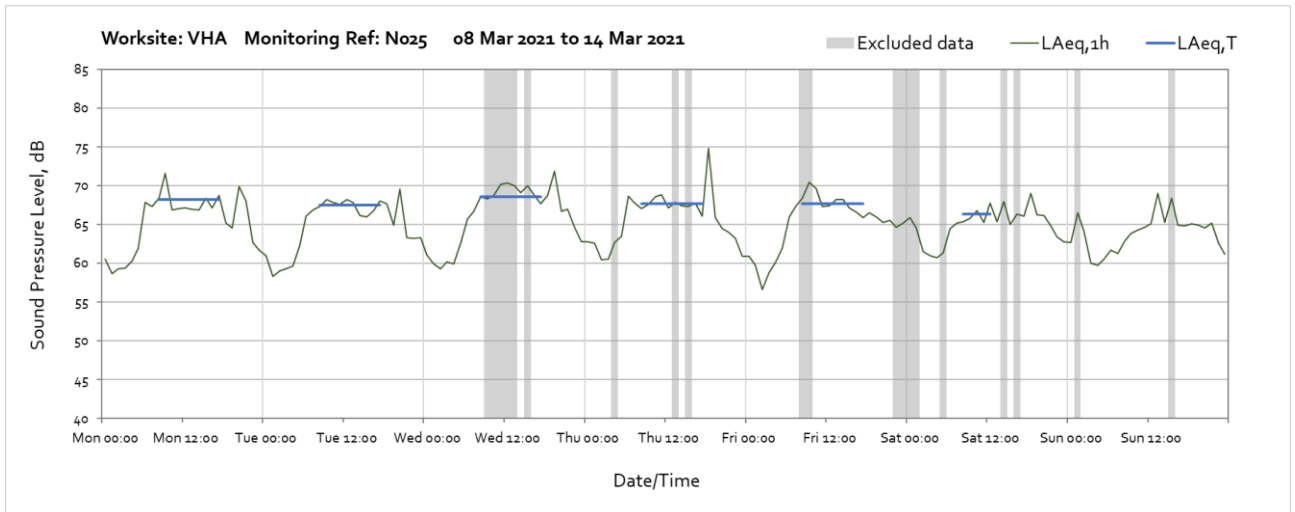
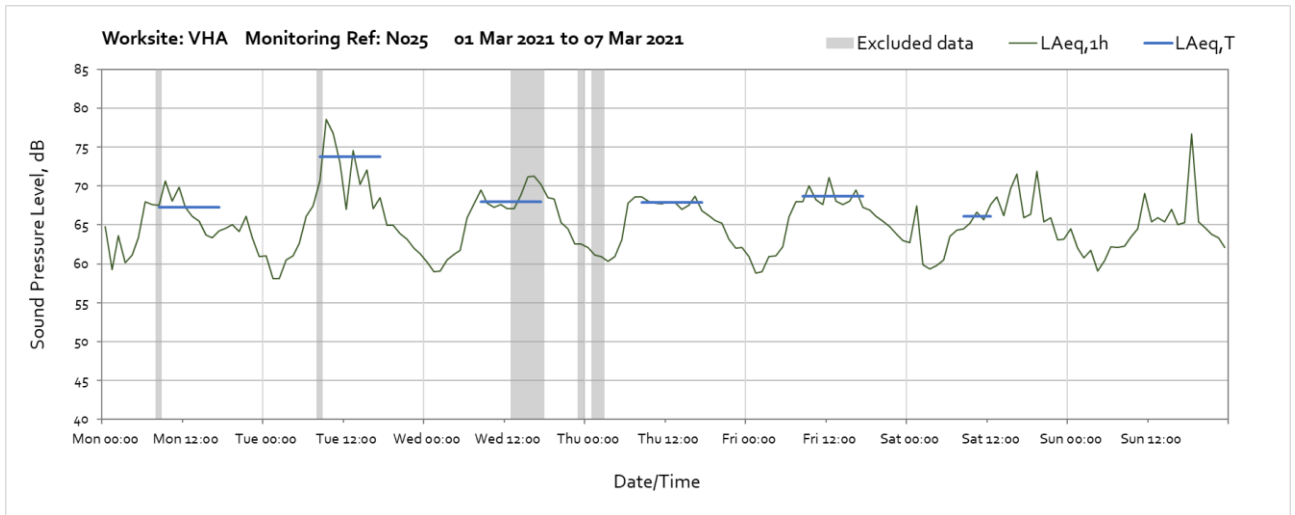


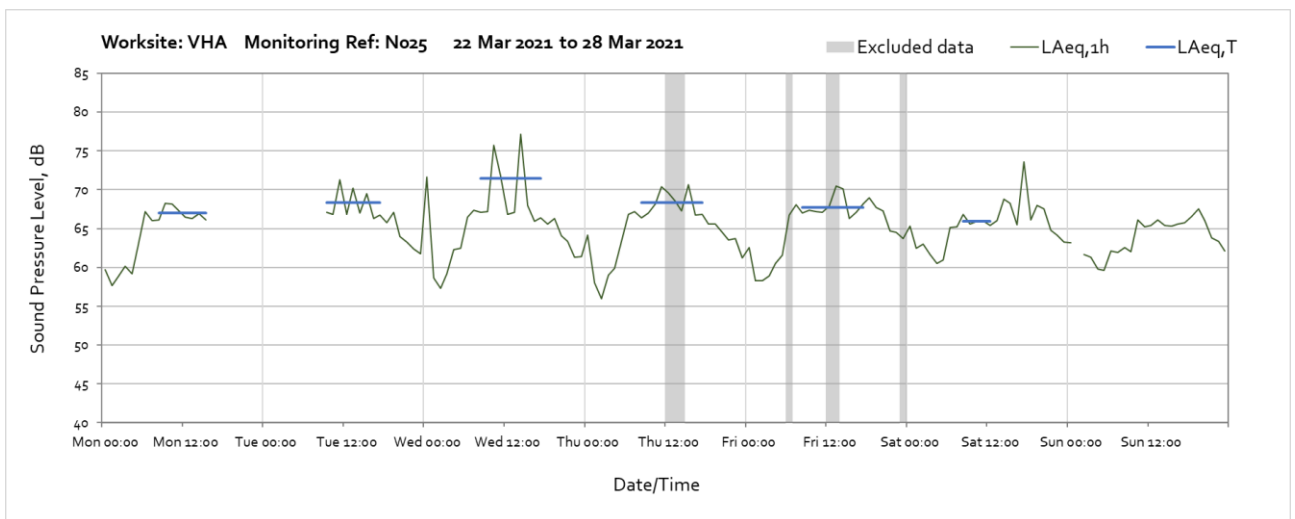
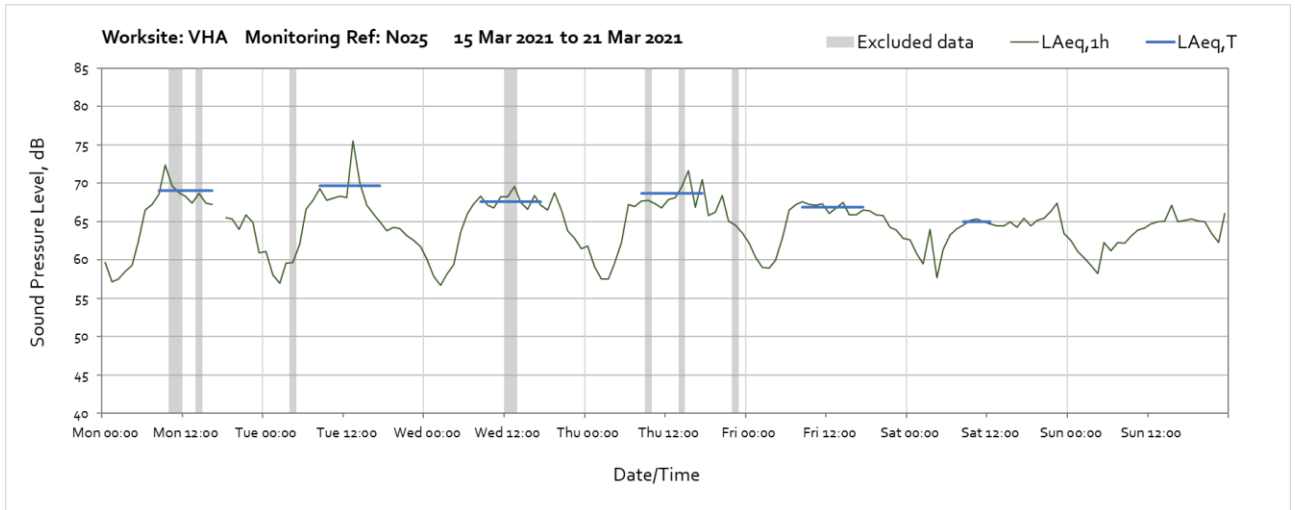


Note: Missing data between 01:00 and 02:00 on Sunday 28th March was due to the clock change (start of BST).

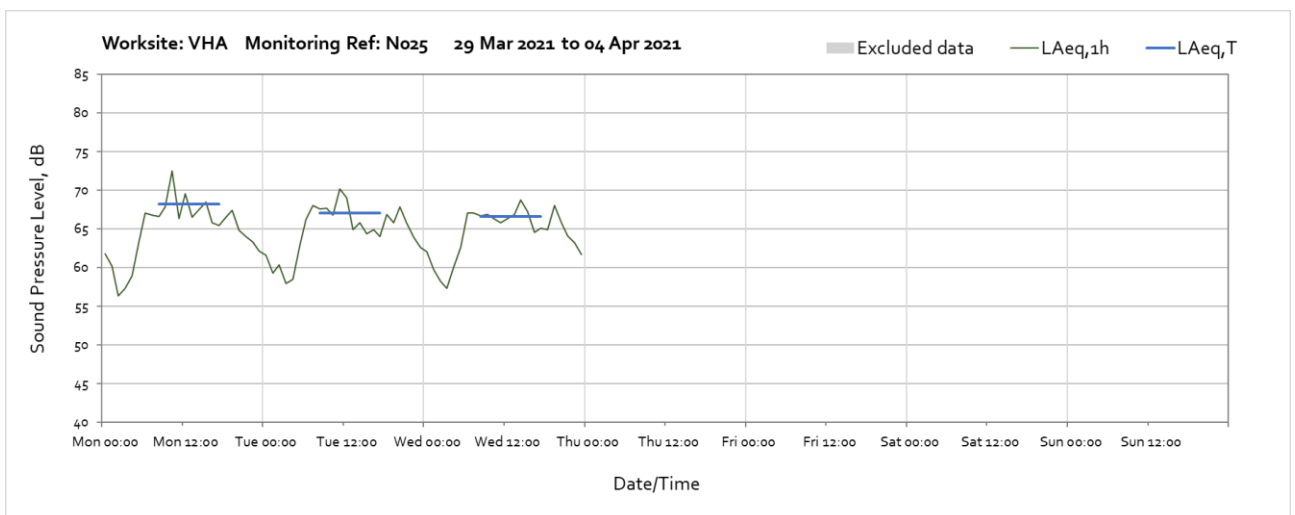


Vehicle Holding Area (VHA) – Monitoring Ref: N025

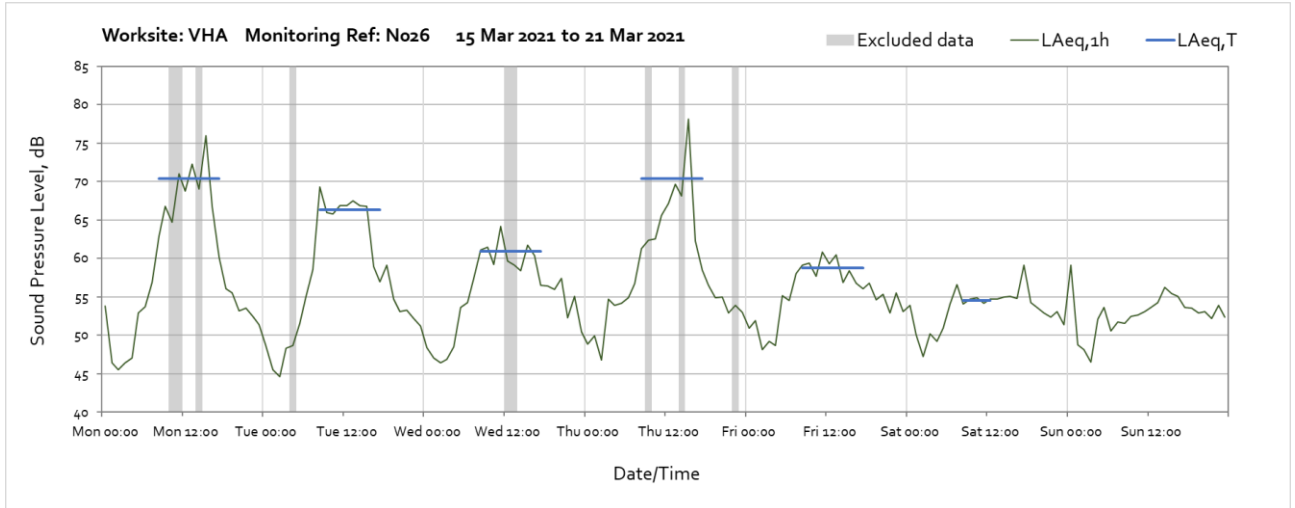
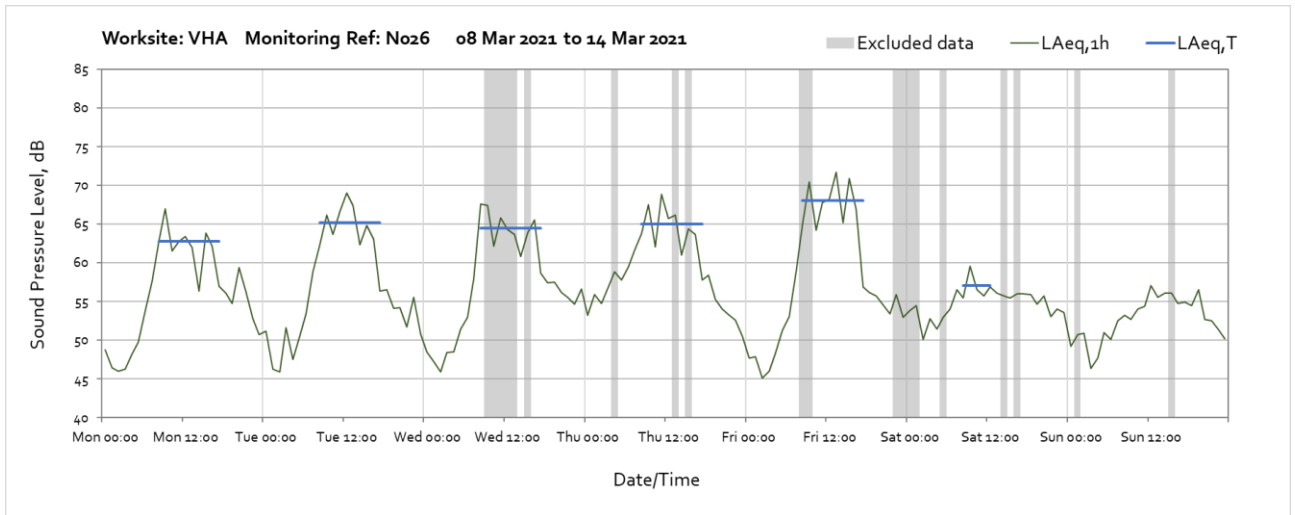
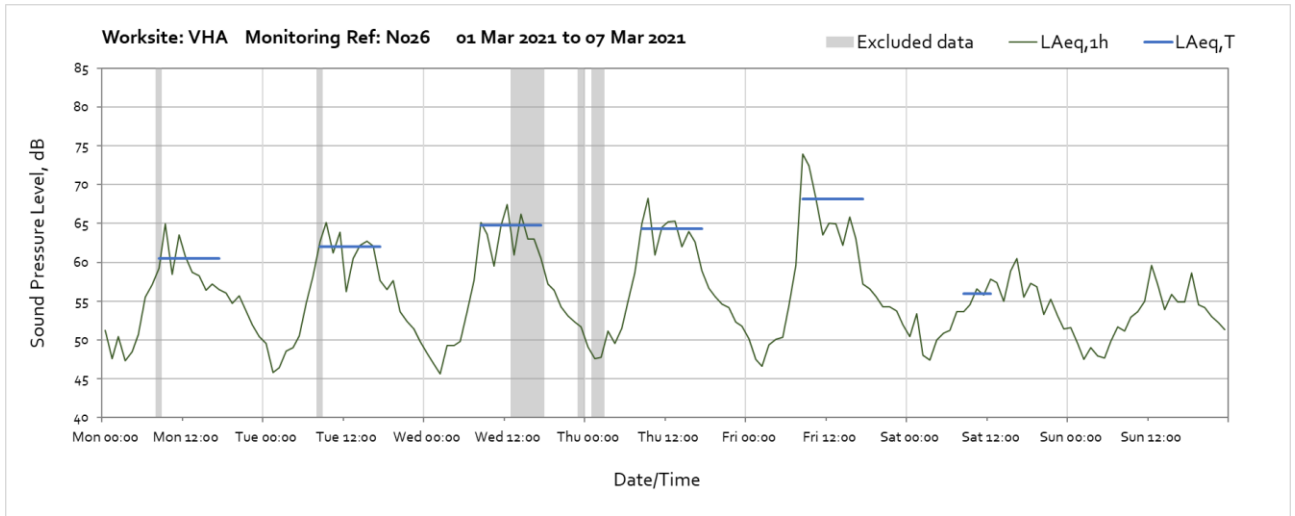


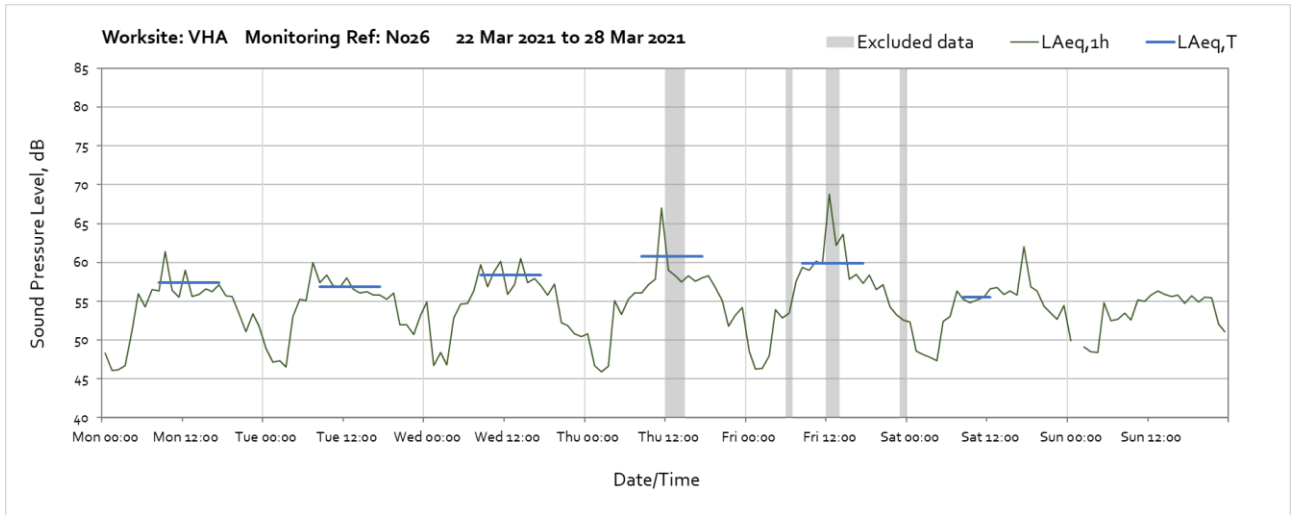


Note: Missing data from 16:00 Monday 22nd March until 09:00 on Monday 23rd March was due to internal memory space becoming full. The internal storage capacity of the monitoring station is currently being upgraded to prevent further data loss. Missing data between 01:00 and 02:00 on Sunday 28th March was due to the clock change (start of BST).

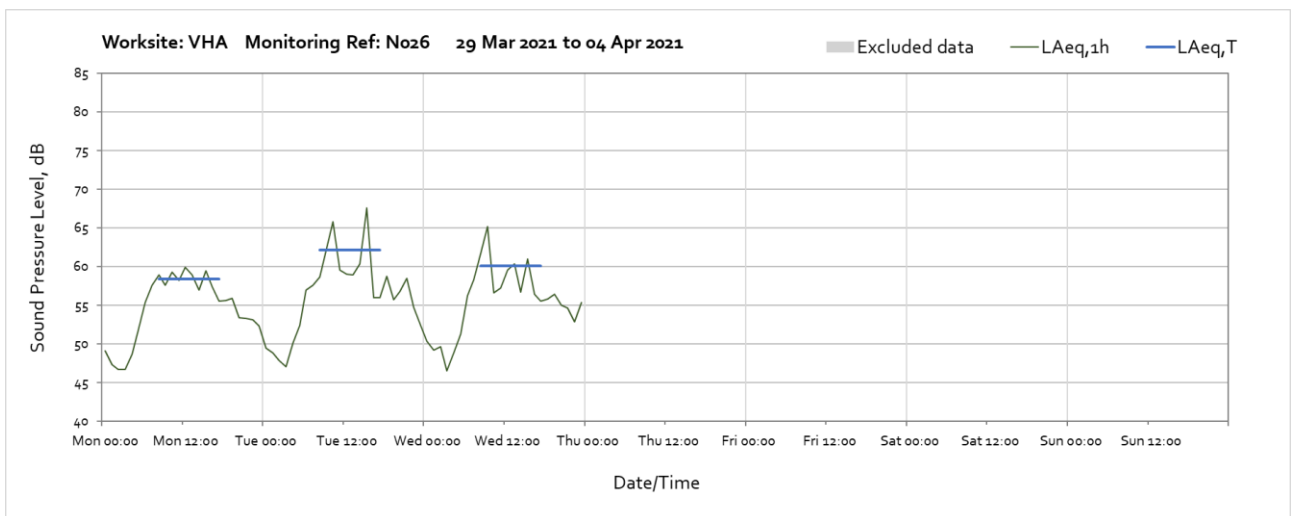


Vehicle Holding Area (VHA) – Monitoring Ref: N026

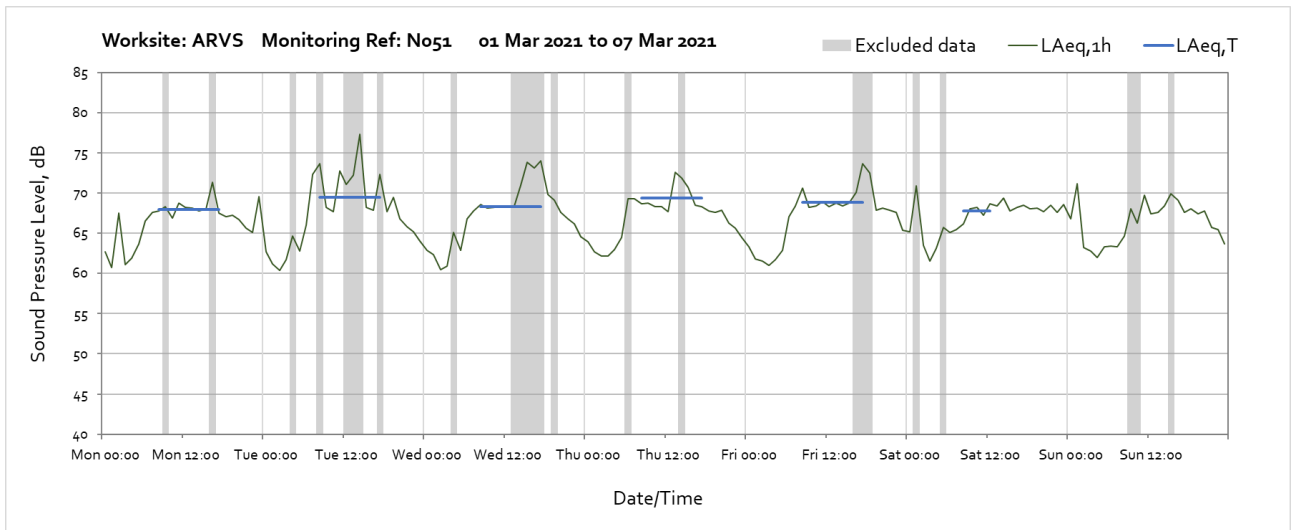


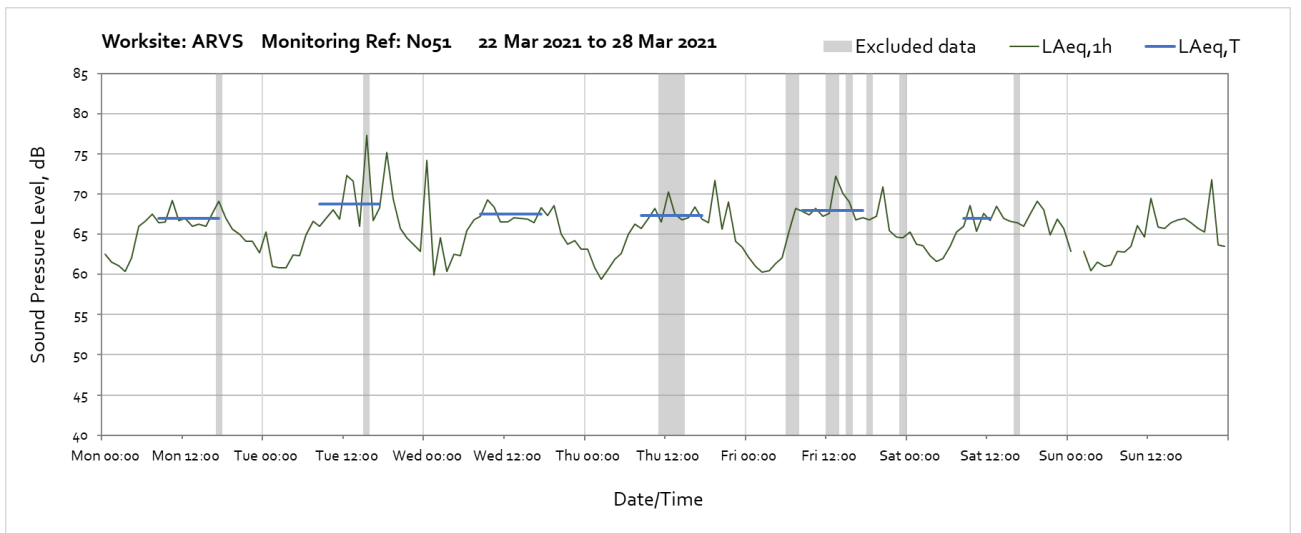
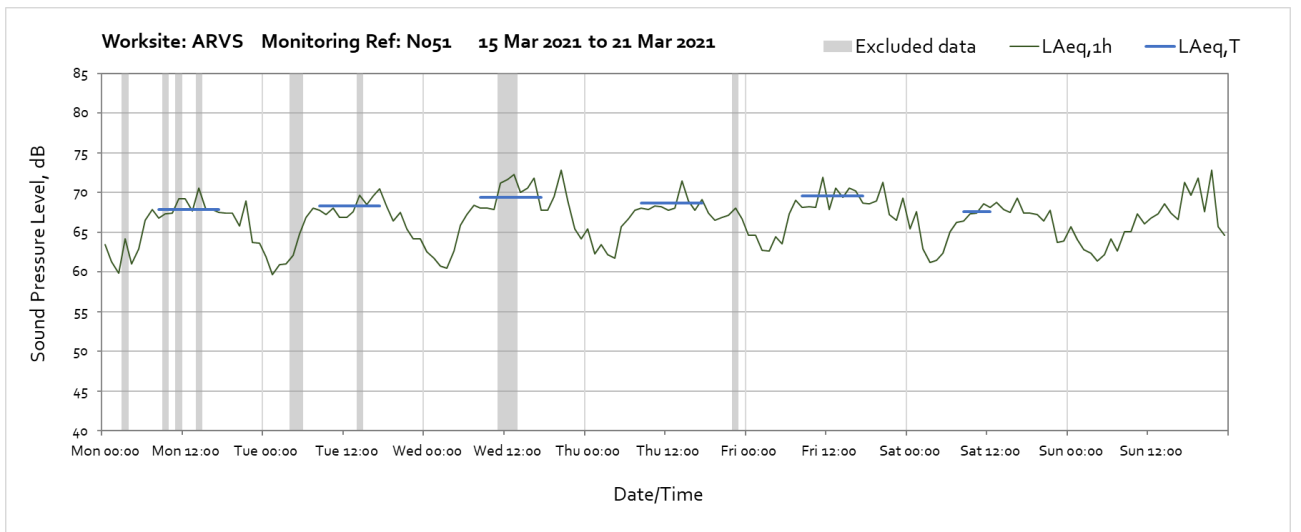
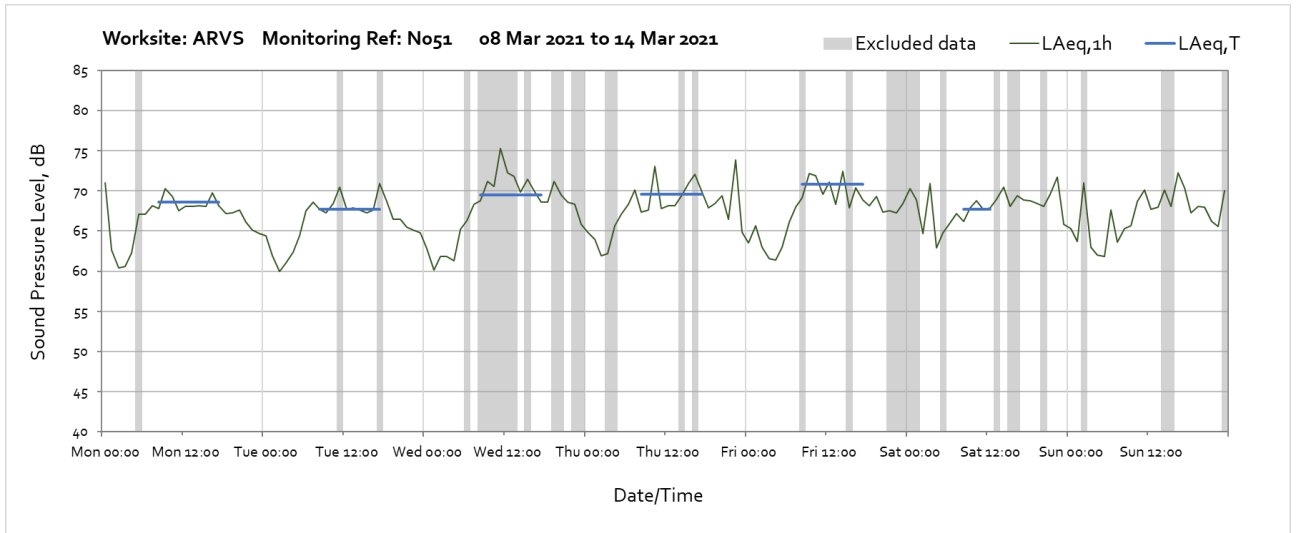


Note: Missing data between 01:00 and 02:00 on Sunday 28th March was due to the clock change (start of BST).

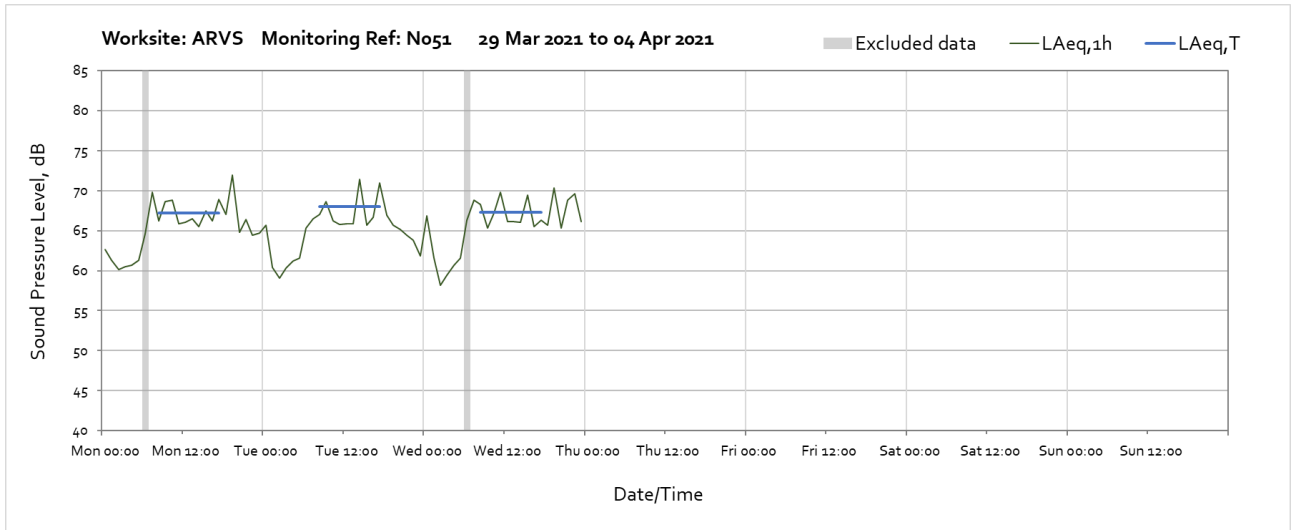


Adelaide Road Ventilation Shaft (ARVS) – Monitoring Ref: N051

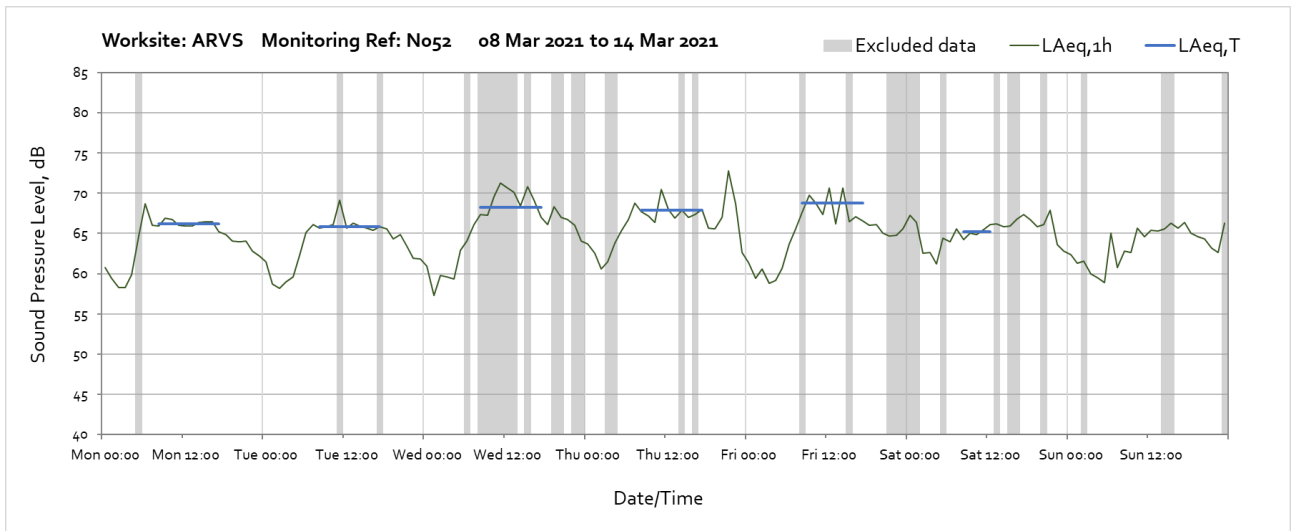
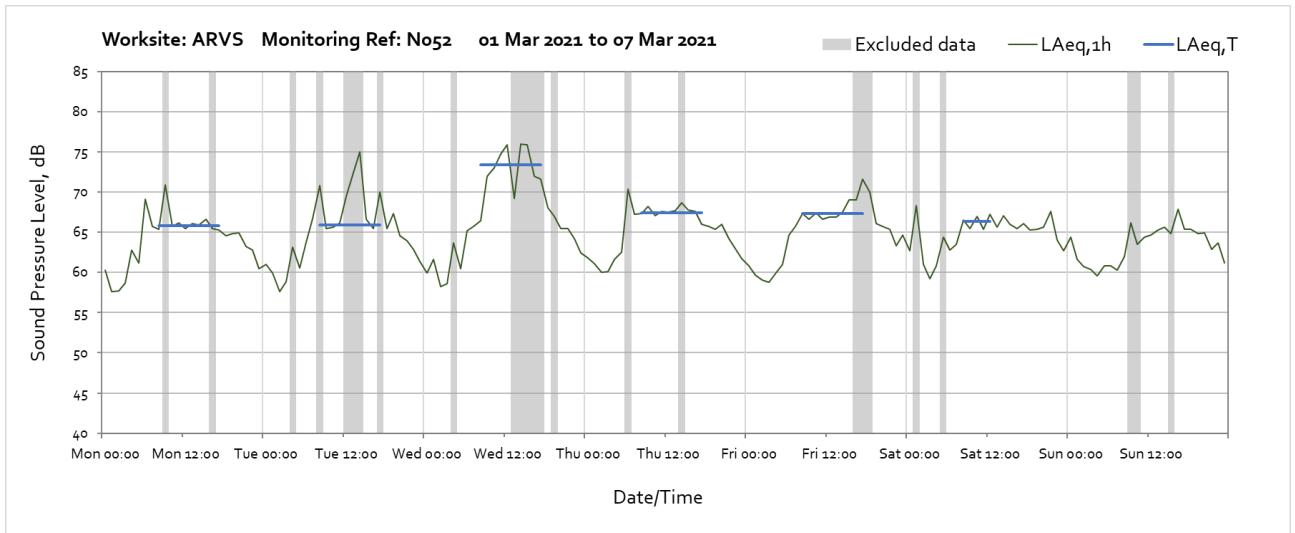


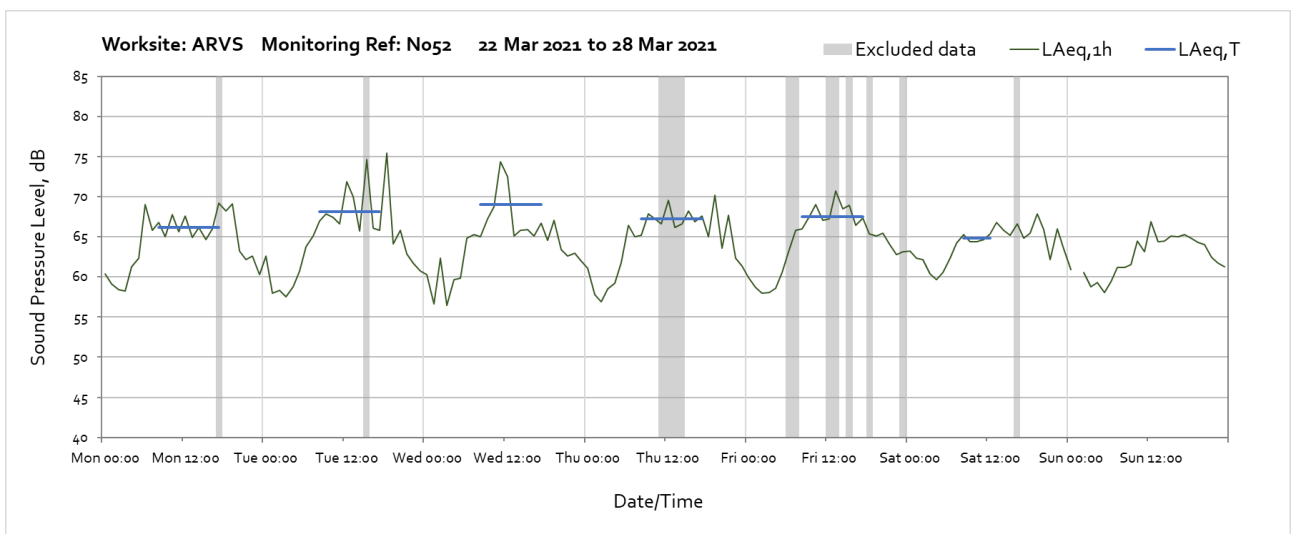
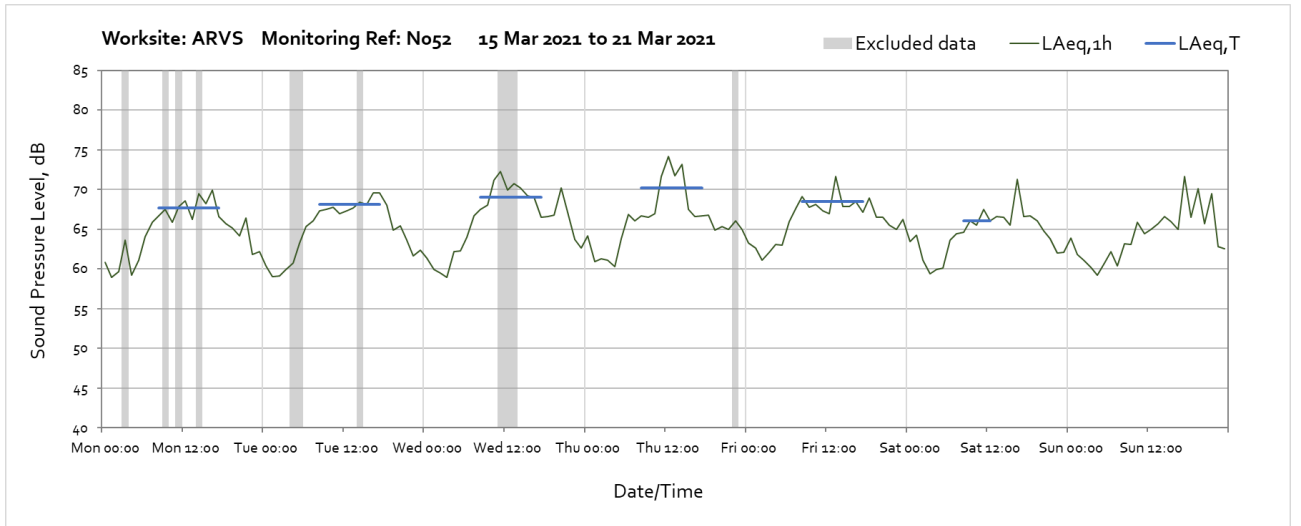


Note: Missing data between 01:00 and 02:00 on Sunday 28th March was due to the clock change (start of BST).

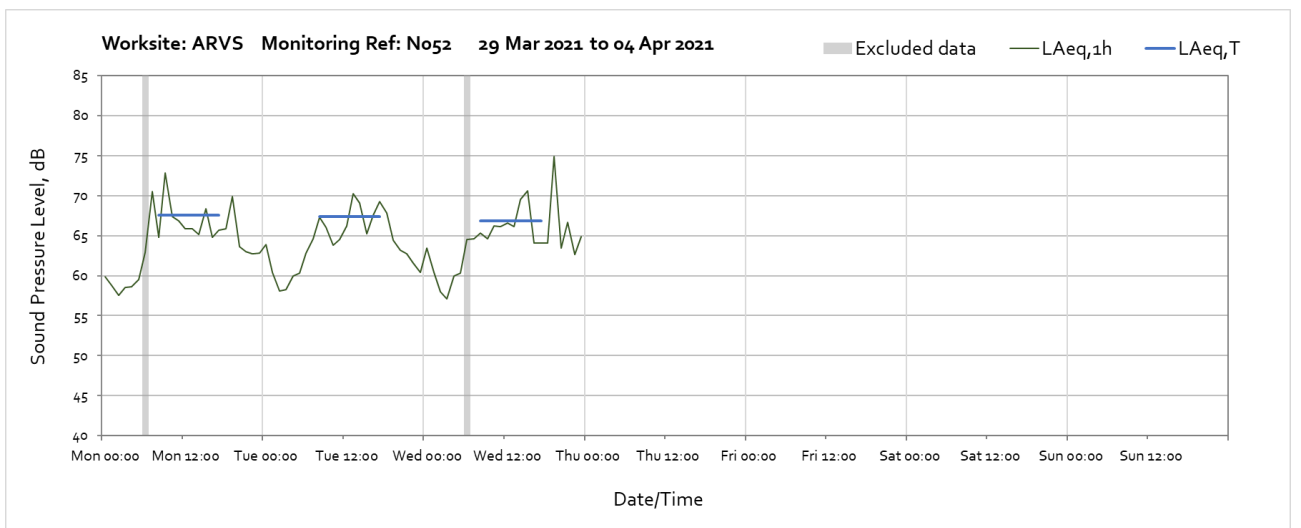


Adelaide Road Ventilation Shaft (ARVS) – Monitoring Ref: N052





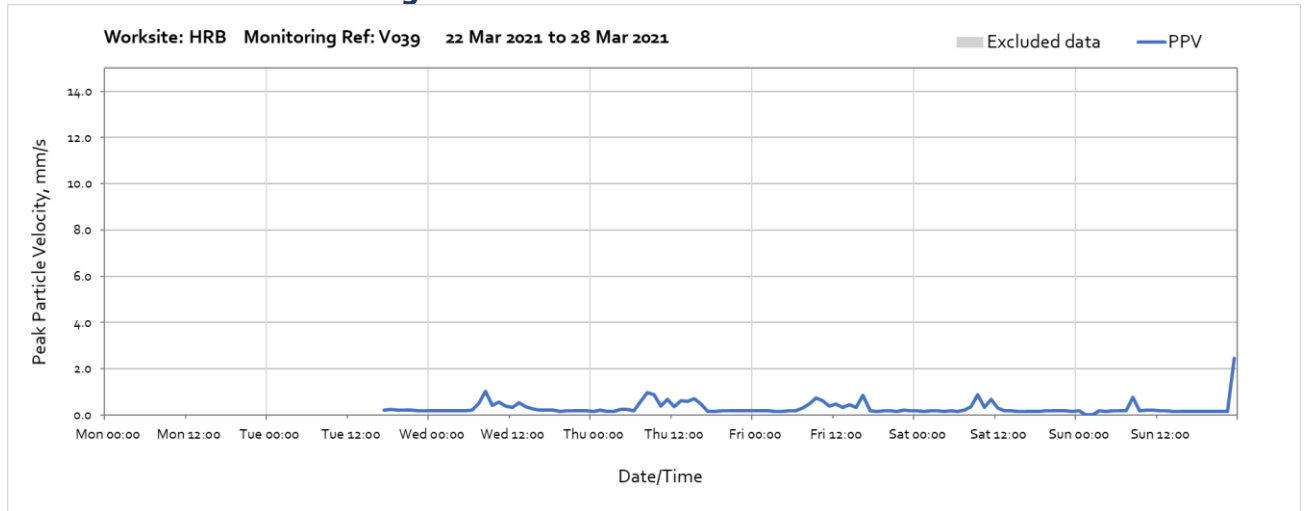
Note: Missing data between 01:00 and 02:00 on Sunday 28th March was due to the clock change (start of BST).



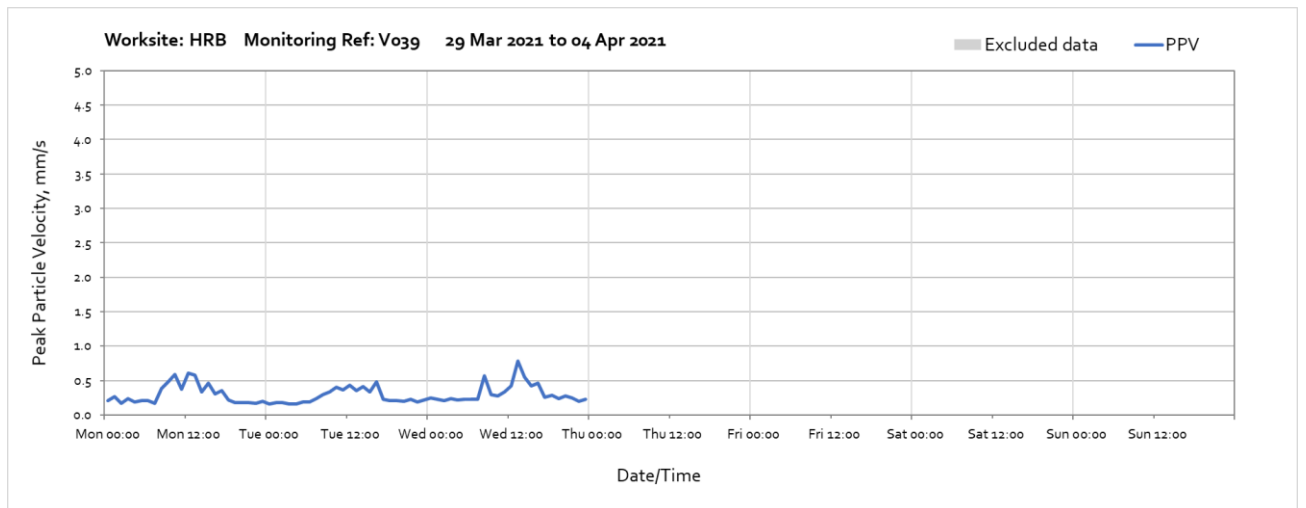
Vibration

The following graphs show the hourly measured peak particle velocity PPV recorded during the monitoring period. The graphs show the resultant PPV due to vibration components on three orthogonal axis x, y and z. Where high values of PPV were caused by local interference with the vibration monitor, which are not representative of HS2 construction works, these values have been greyed out in the following charts and have been excluded to calculate values in Table 4 of the main report.

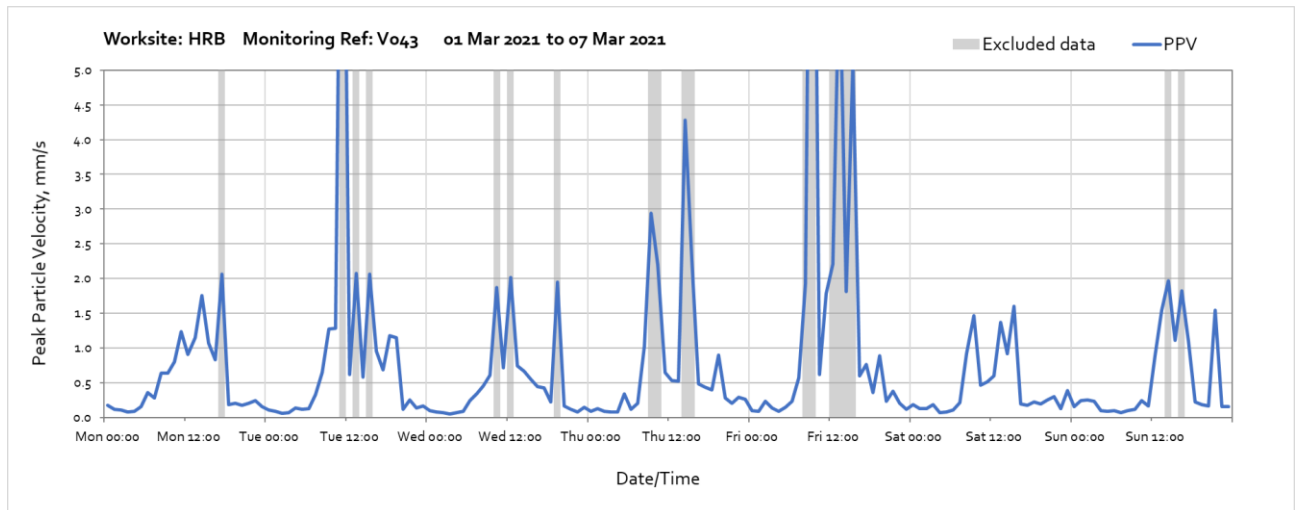
Worksite: HRB – Monitoring Ref: V039



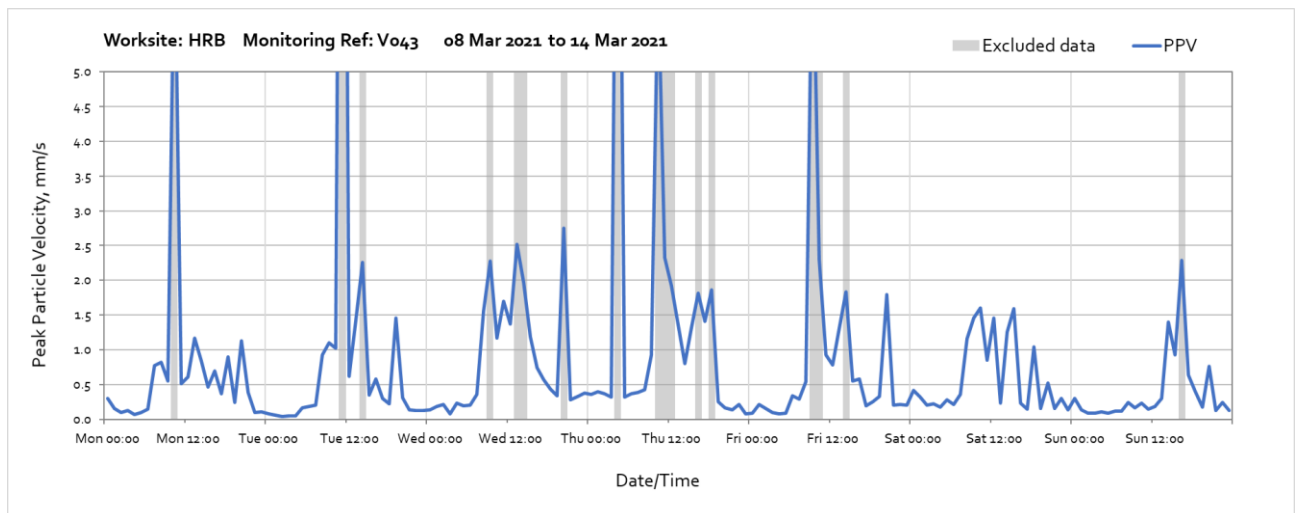
Note: Due to a coupling issue at the interface between the monitor and the ground no valid data were collected from the start of the month until 17:00 on Tuesday 23rd March. Missing data between 01:00 and 03:00 on Sunday 28th March was due to the clock change (start of BST).



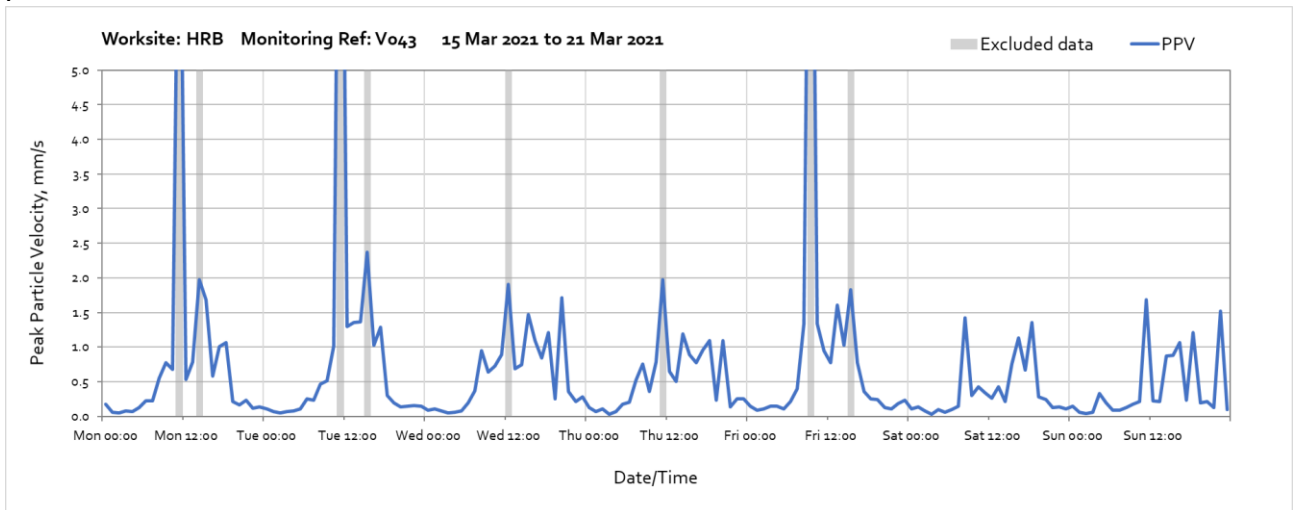
Worksite: HRB – Monitoring Ref: V043



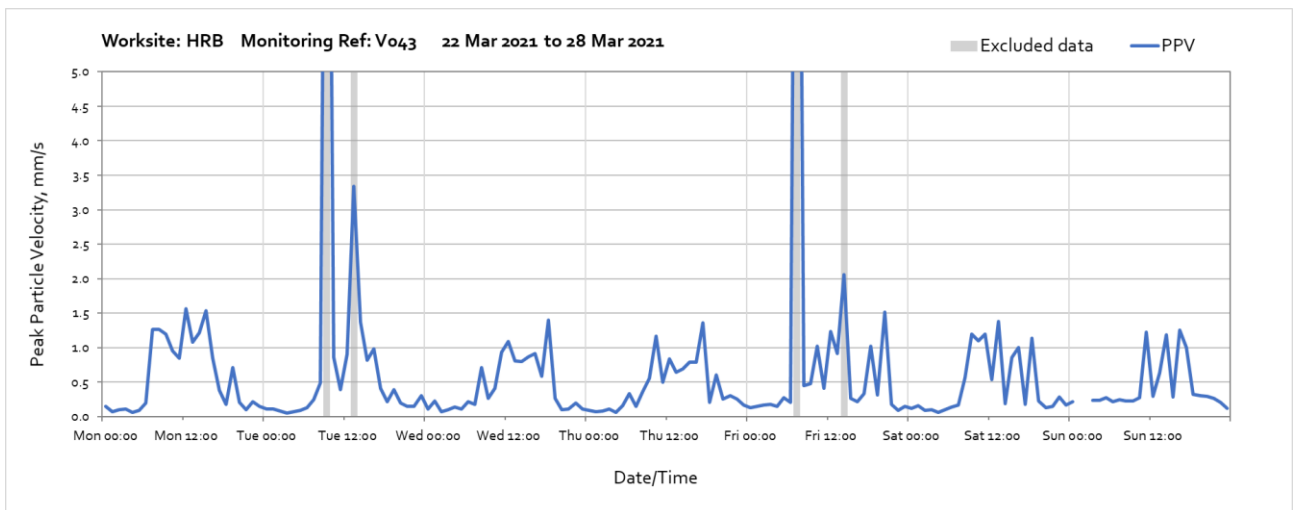
Note: High vibration levels measured throughout the week were due to the use of the nearby residential bin store and local interference of the monitor and are not representative of HS2 vibration levels.



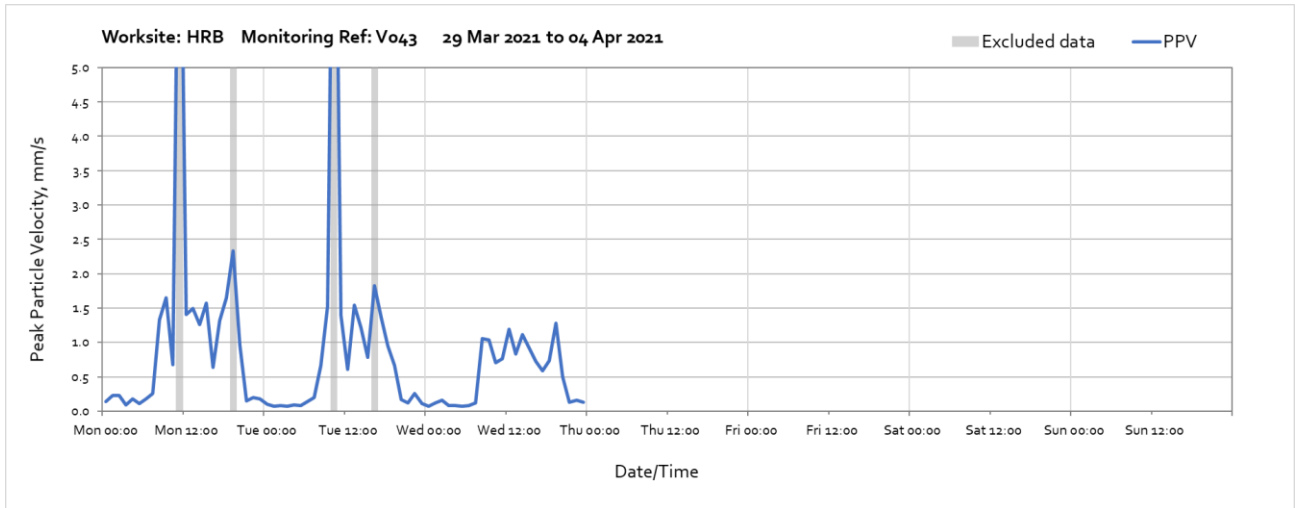
Note: High vibration levels measured throughout the week were due to the use of the nearby residential bin store and local interference of the monitor and are not representative of HS2 vibration levels.



Note: High vibration levels measured throughout the week were due to the use of the nearby residential bin store and local interference of the monitor and are not representative of HS2 vibration levels.

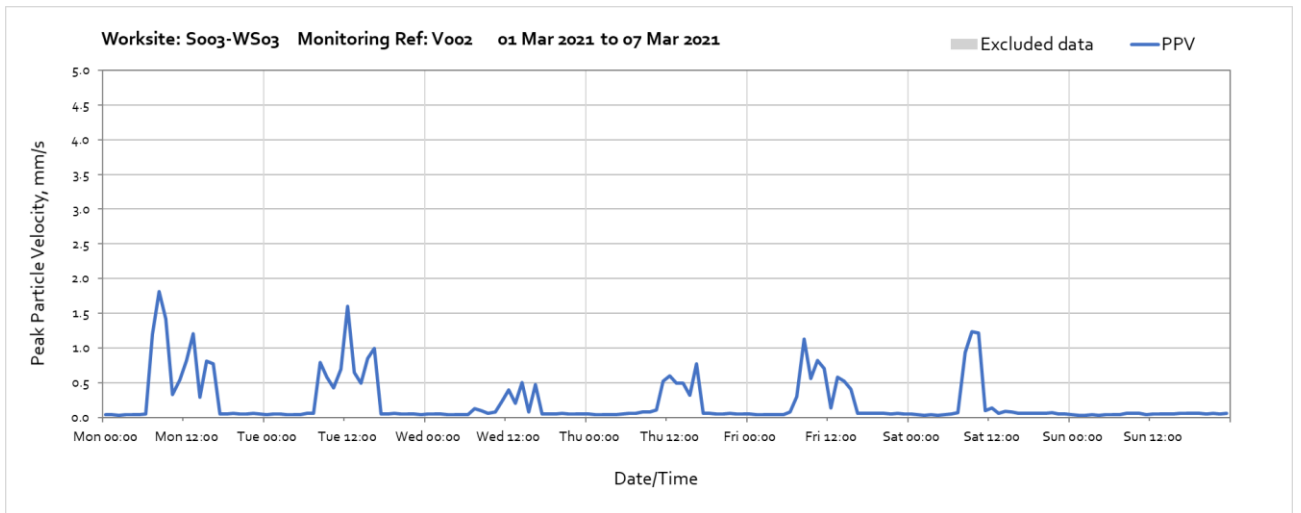


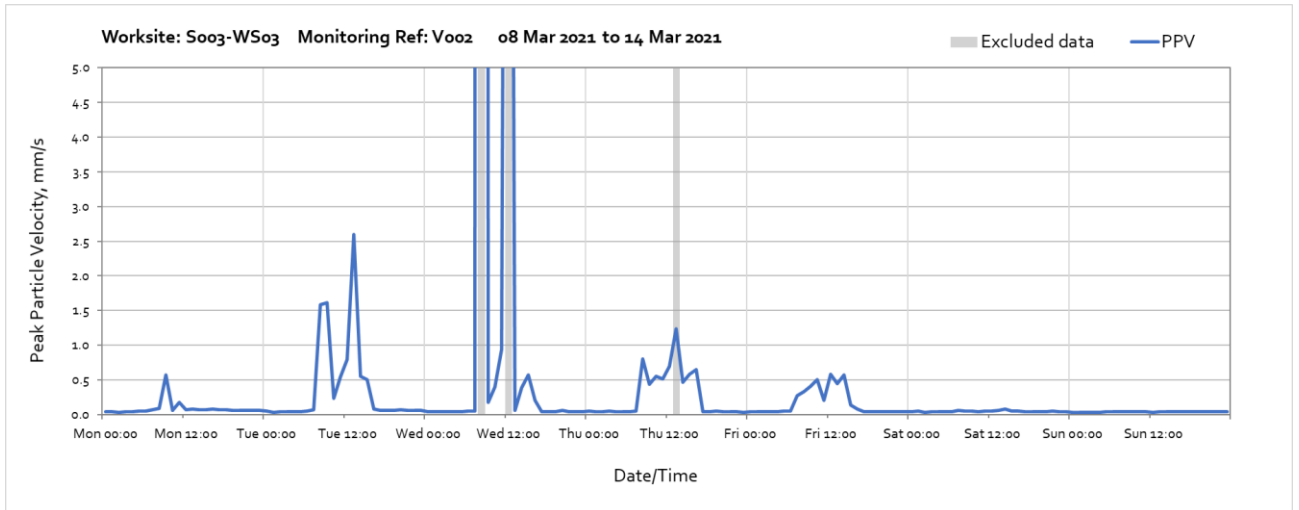
Note: High vibration levels measured throughout the week were due to the use of the nearby residential bin store and local interference of the monitor and are not representative of HS2 vibration levels. Missing data between 01:00 and 03:00 on Sunday 28th March was due to the clock change (start of BST).



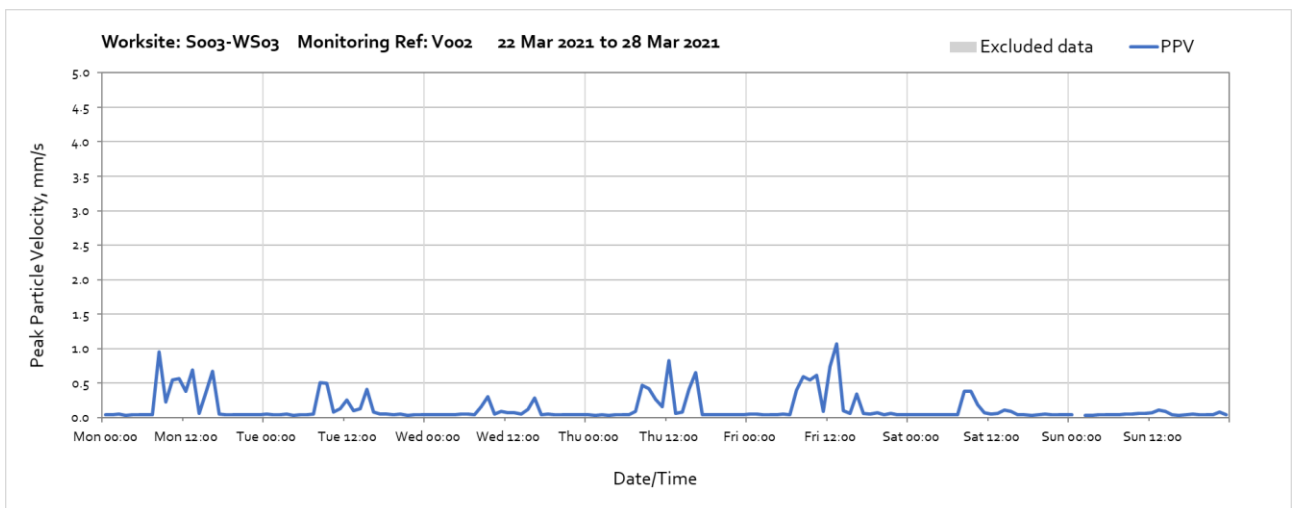
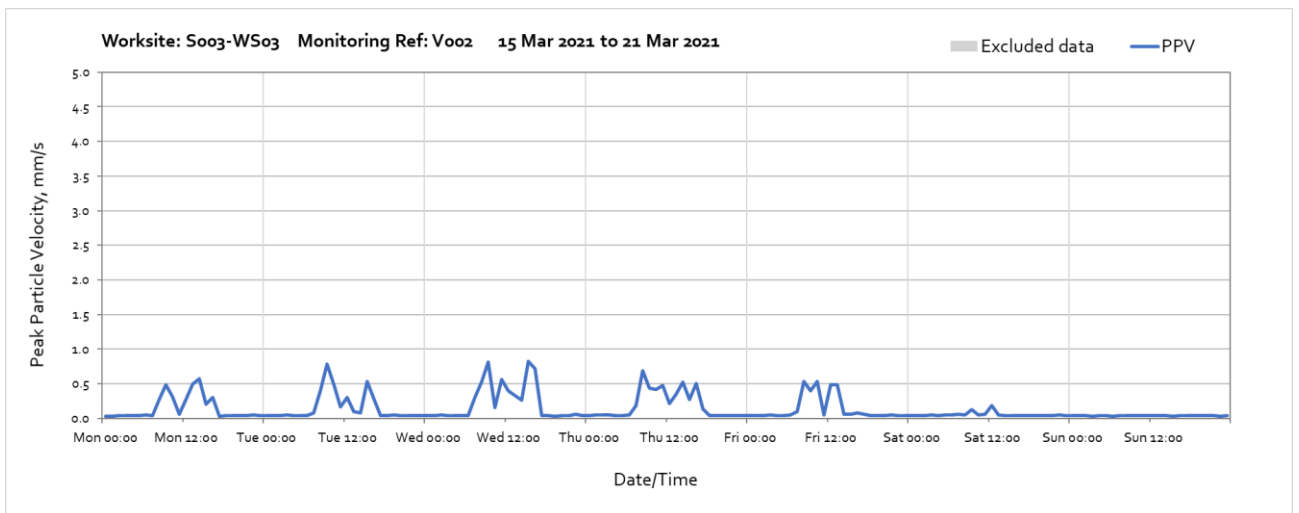
Note: High vibration levels measured throughout the week were due to the use of the nearby residential bin store and local interference of the monitor and are not representative of HS2 vibration levels.

Worksite: S003-WS03 – Monitoring Ref: V002



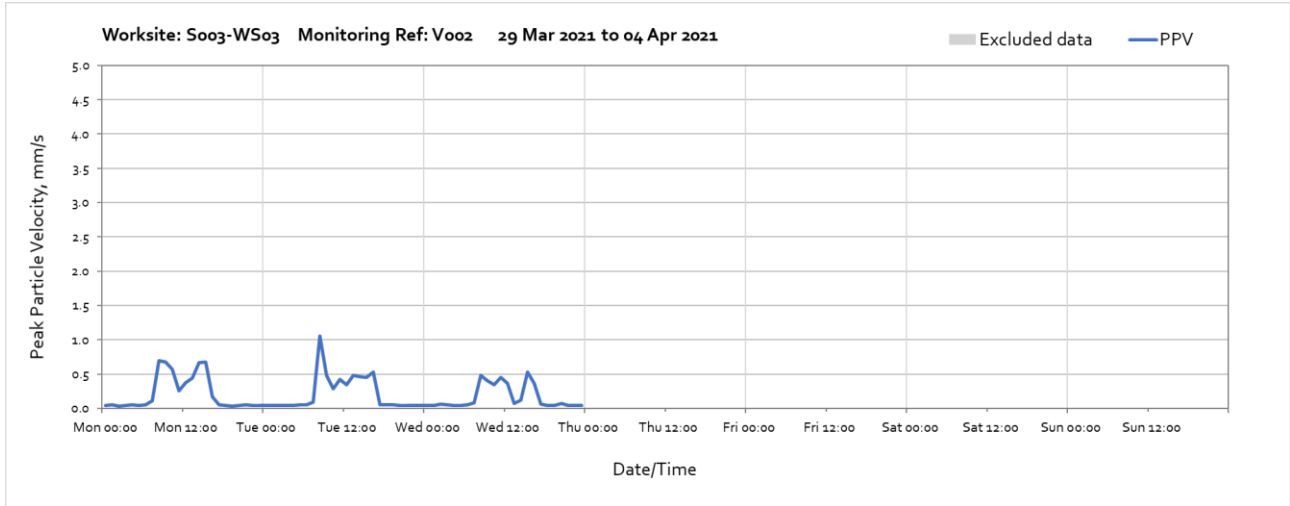


Note: High vibration levels at 08:00 and 12:00 on Wednesday 10th March were due to local interference of the monitor and are not representative of HS2 vibration levels. High vibration levels at 12:00 on Thursday 11th March were due to routine maintenance of the monitoring station.

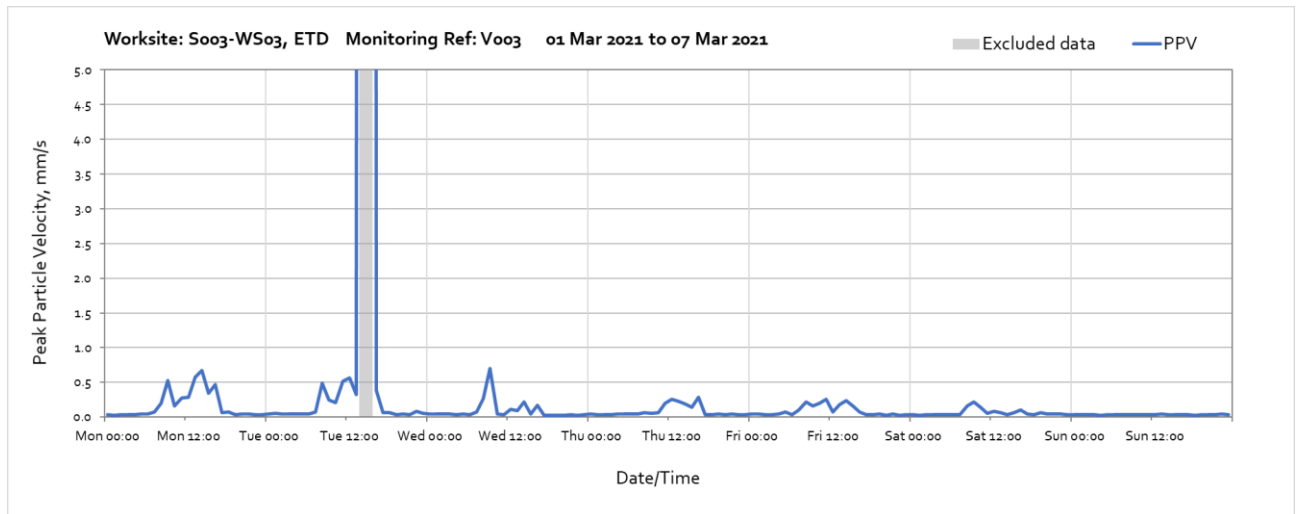


Note: Missing data between 01:00 and 02:00 on Sunday 28th March was due to the clock change (start of BST).

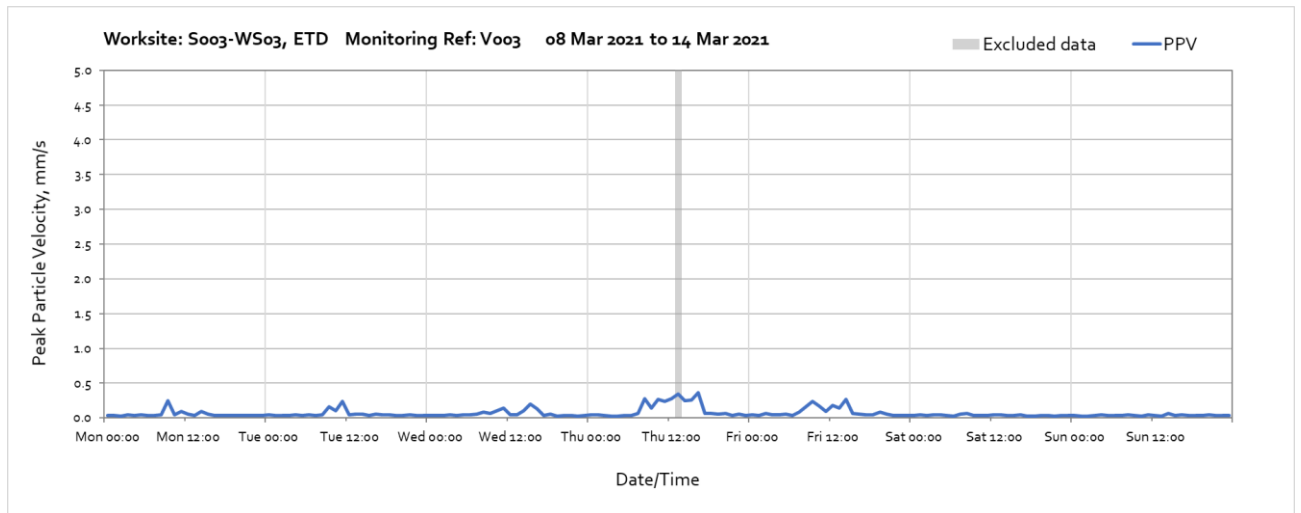
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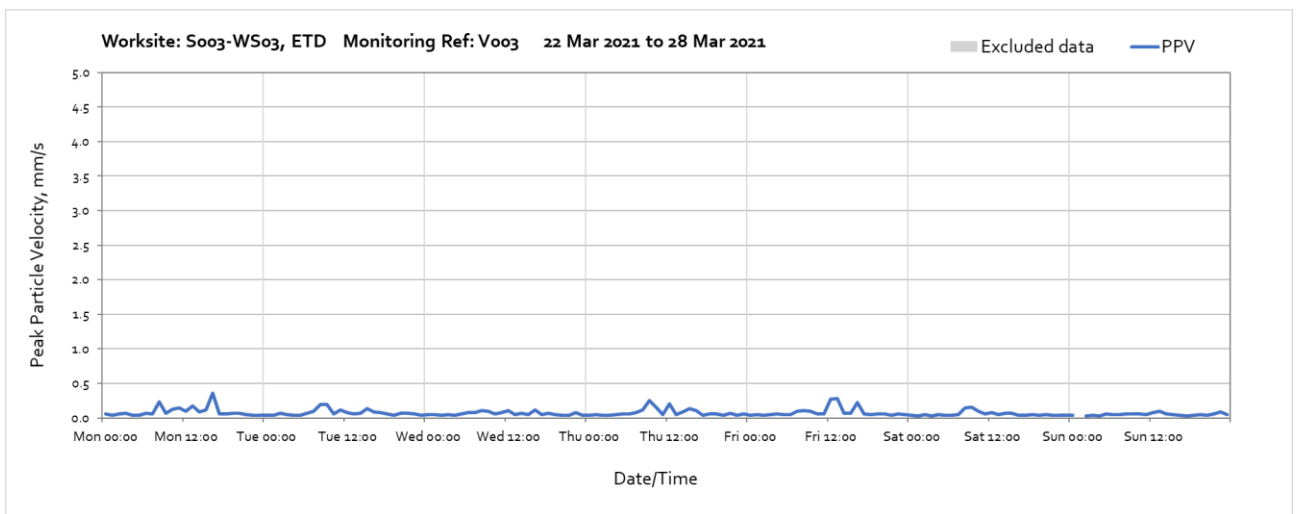
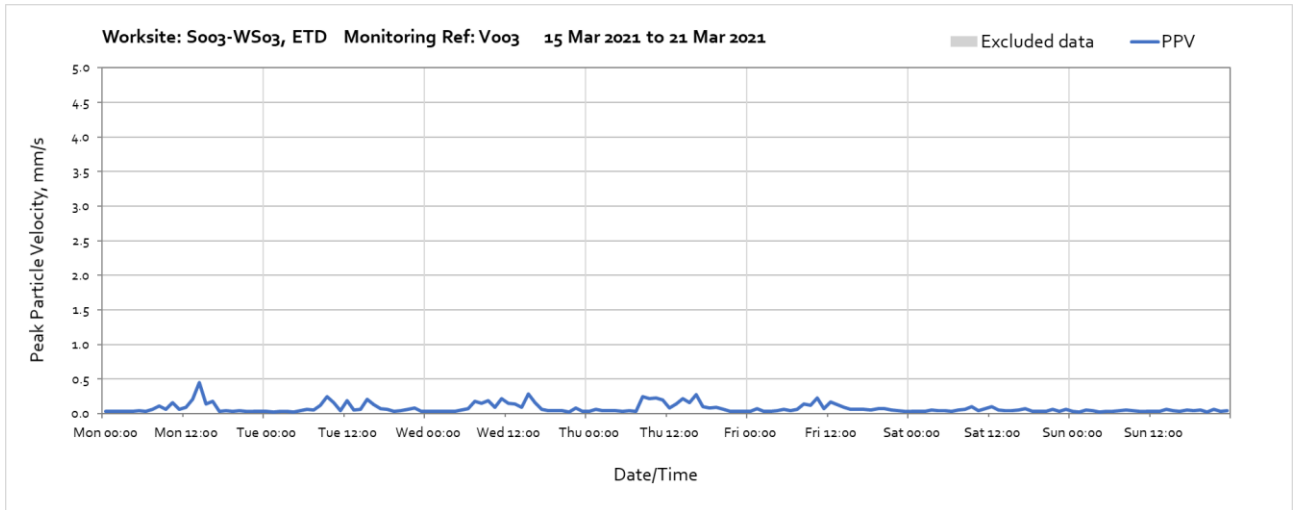
Worksite: S003-WS03, ETD – Monitoring Ref: V003



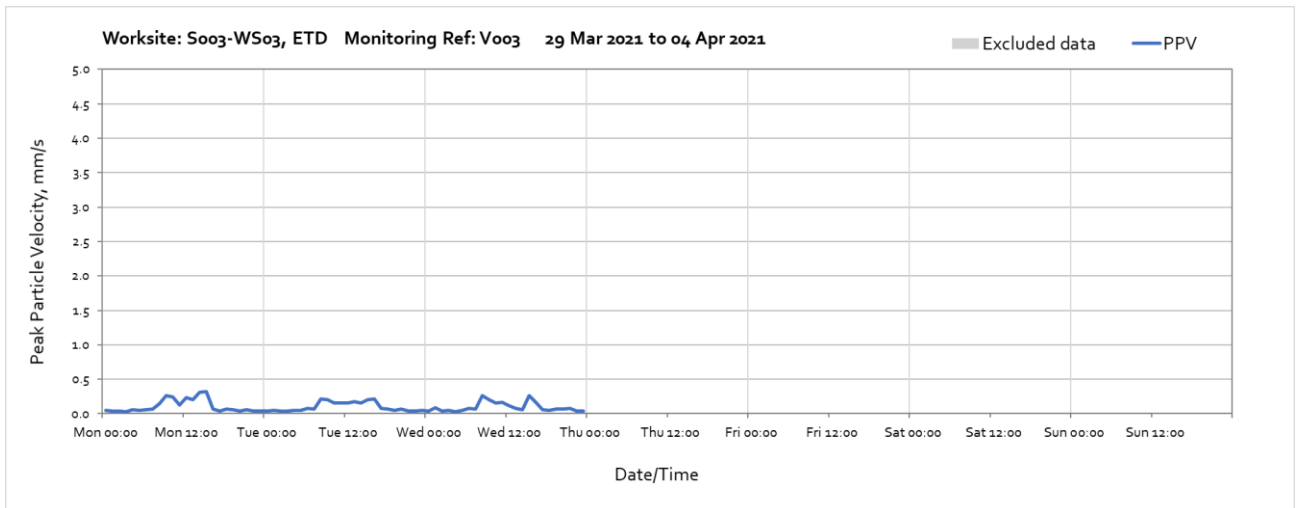
Note: High vibration levels measured between 13:00 – 15:00 on Tuesday 2nd March was due to local interference of the monitor and are not representative of HS2 vibration levels.



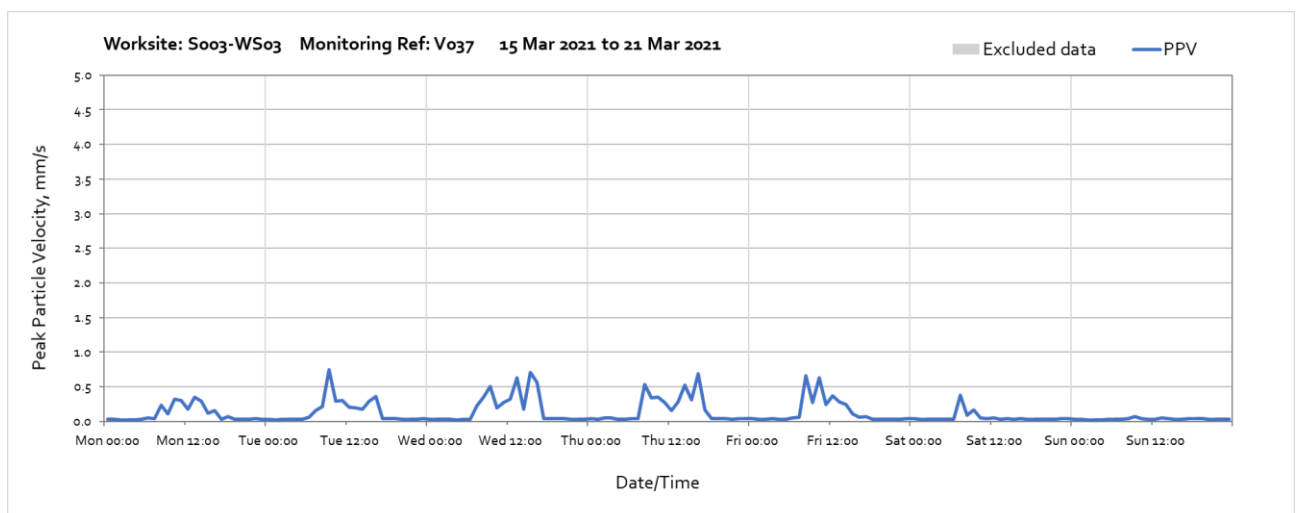
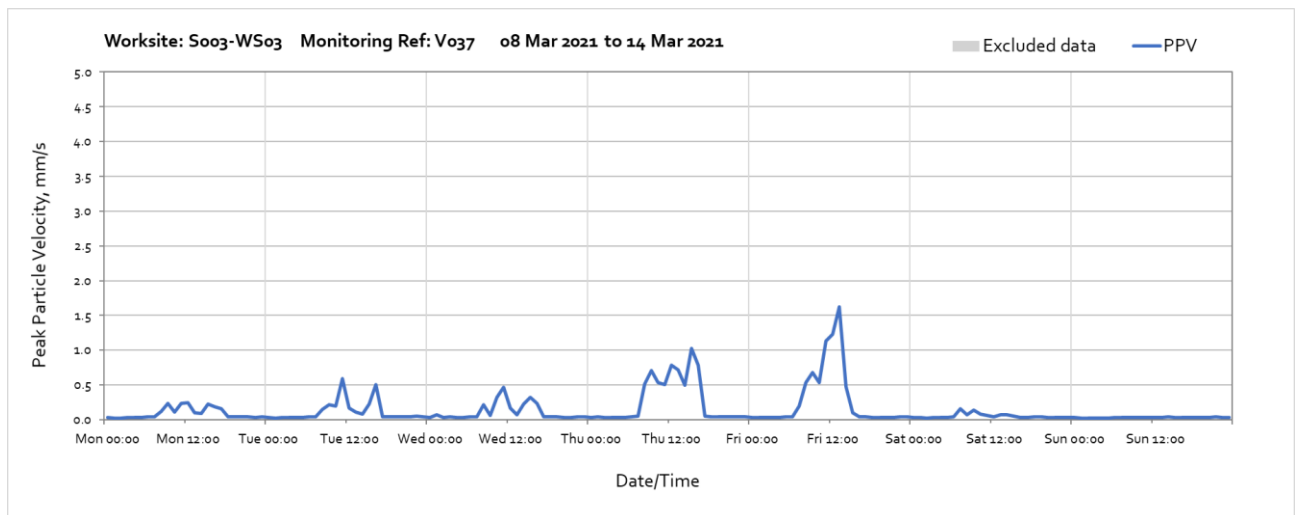
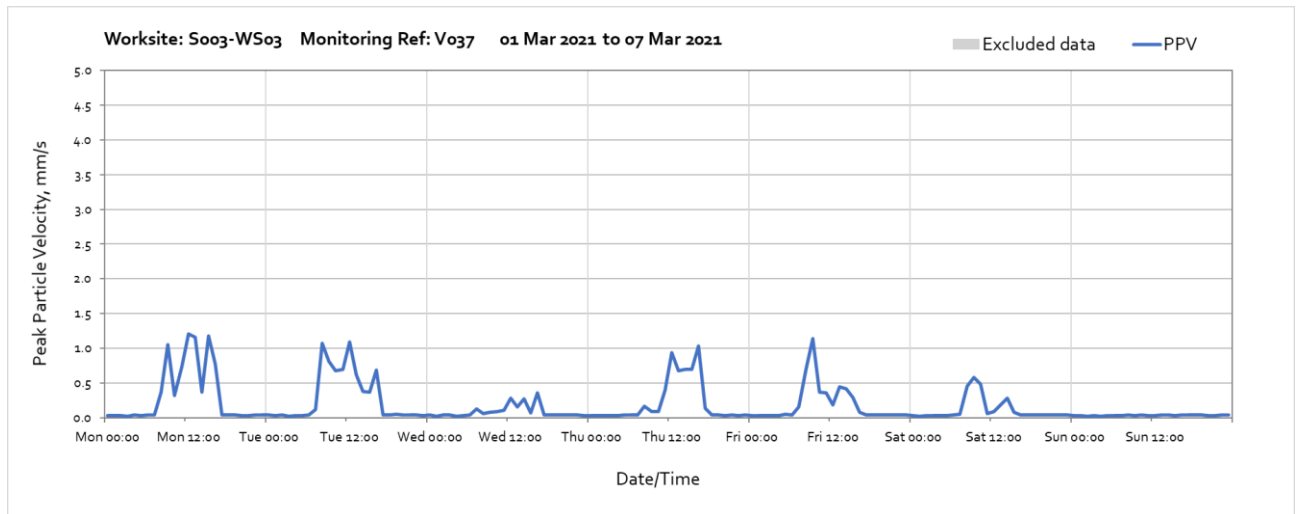
Note: High vibration levels at 13:00 on Thursday 11th March were due to routine maintenance of the monitoring station and are not representative of HS2 vibration levels.

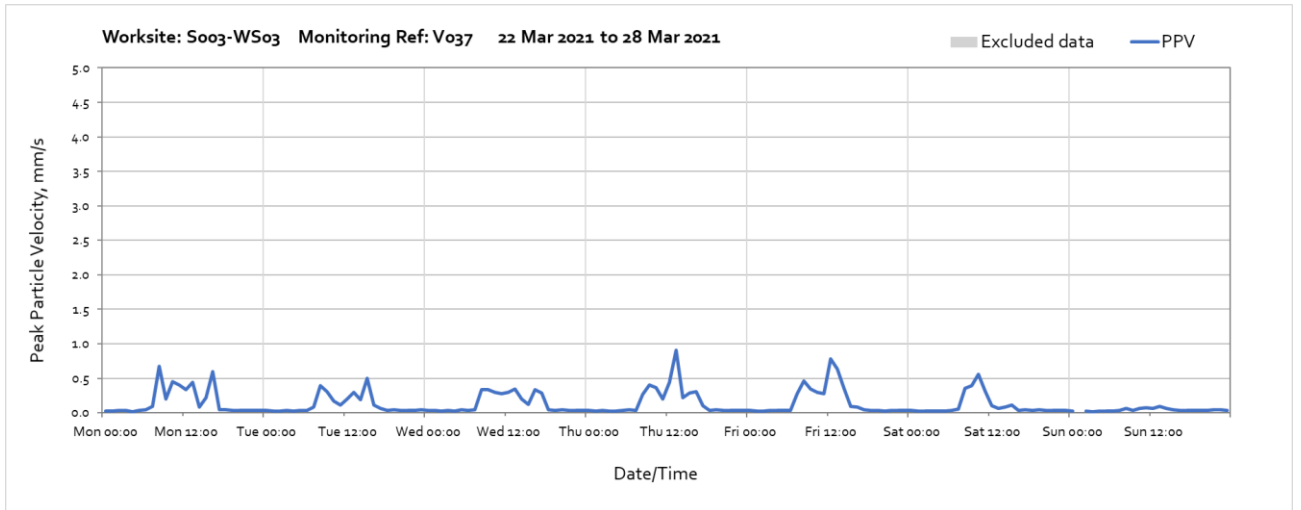


Note: Missing data between 01:00 and 02:00 on Sunday 28th March was due to the clock change (start of BST).

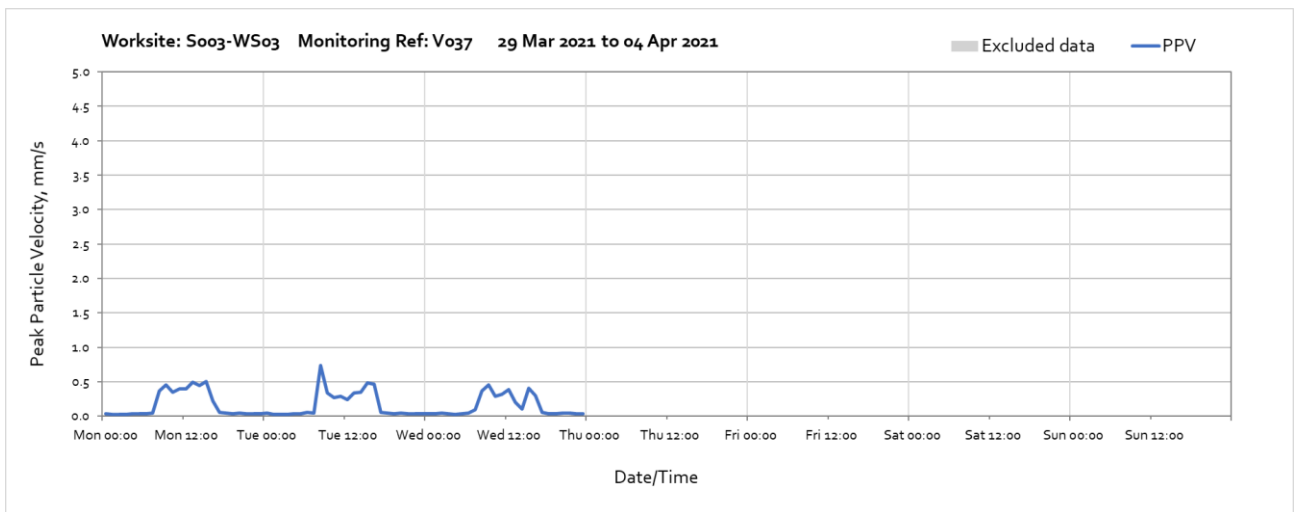


Worksite: S003-WS03 – Monitoring Ref: V037

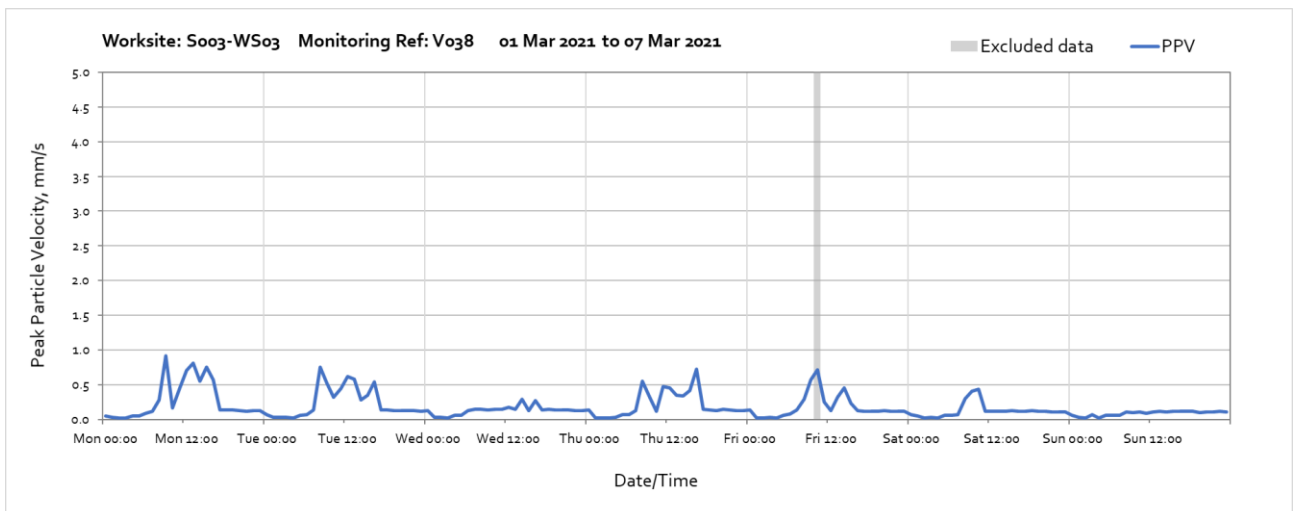




Note: Missing data between 01:00 and 02:00 on Sunday 28th March was due to the clock change (start of BST).

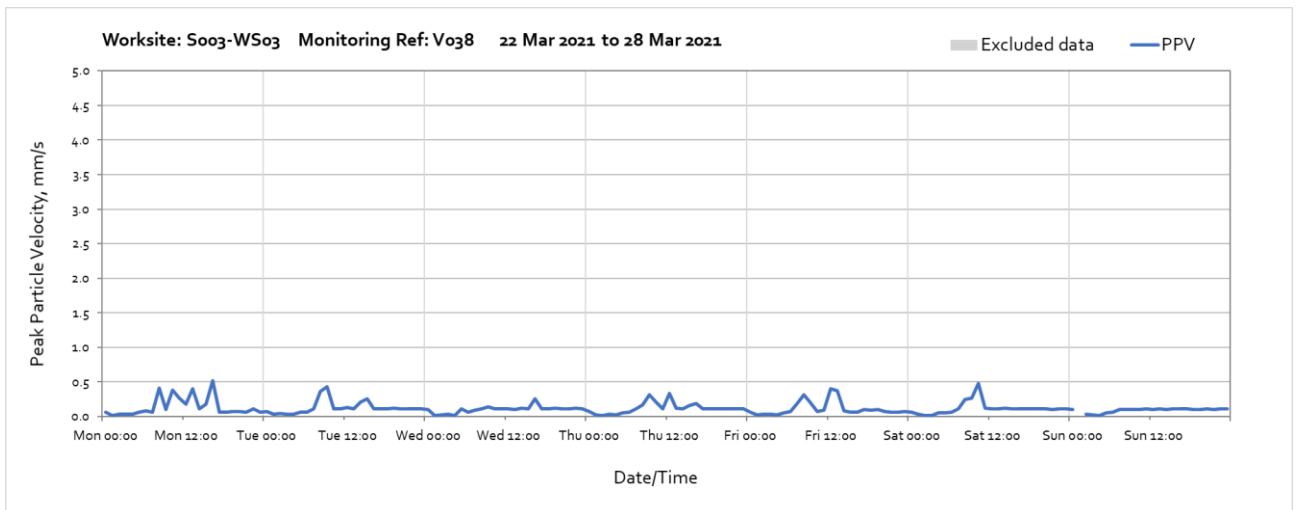
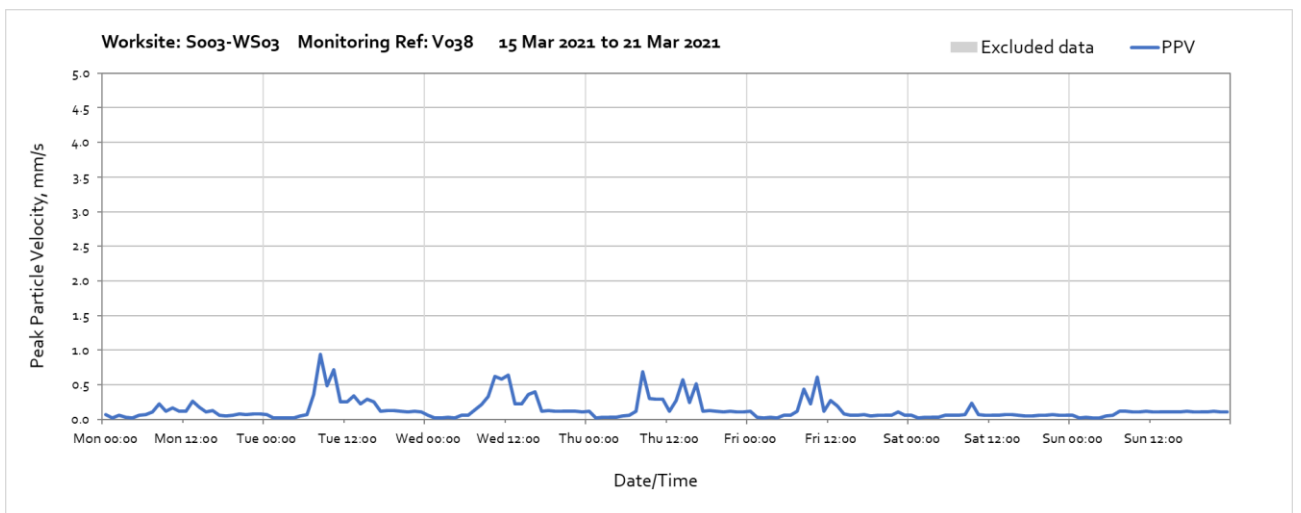
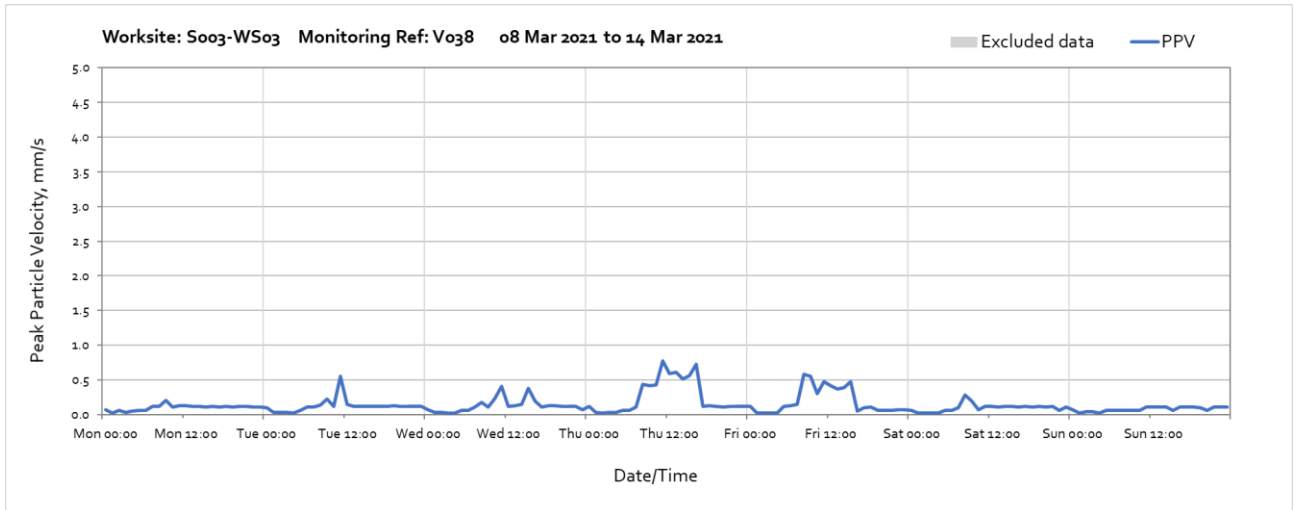


Worksite: S003-WS03 – Monitoring Ref: V038

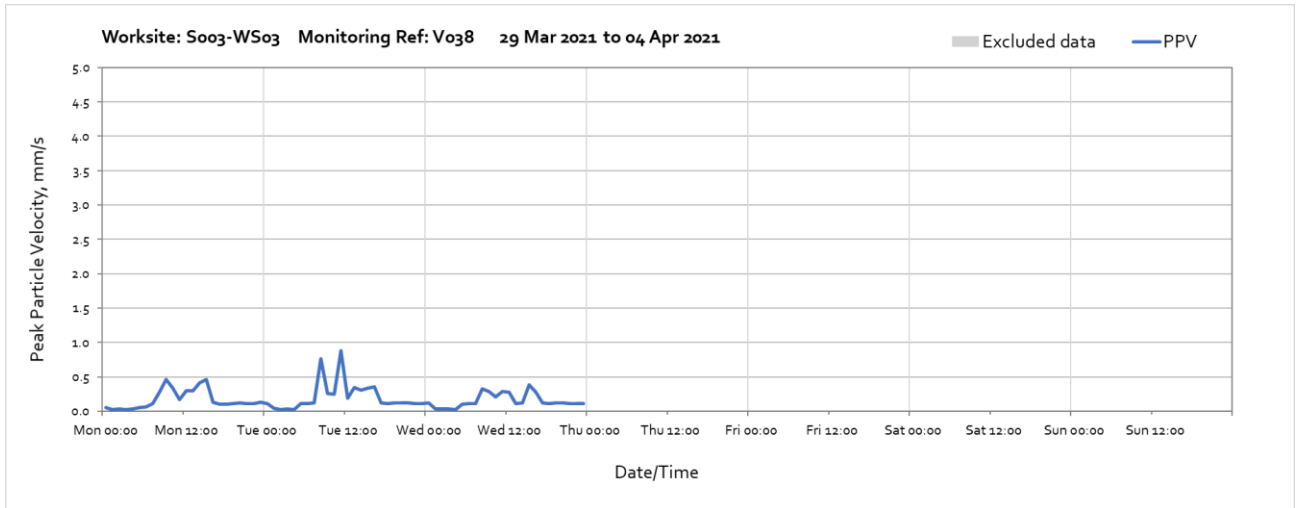


Note: High vibration levels at 10:00 on Friday 5th March were due to routine maintenance of the monitoring station and are not representative of HS2 vibration levels.

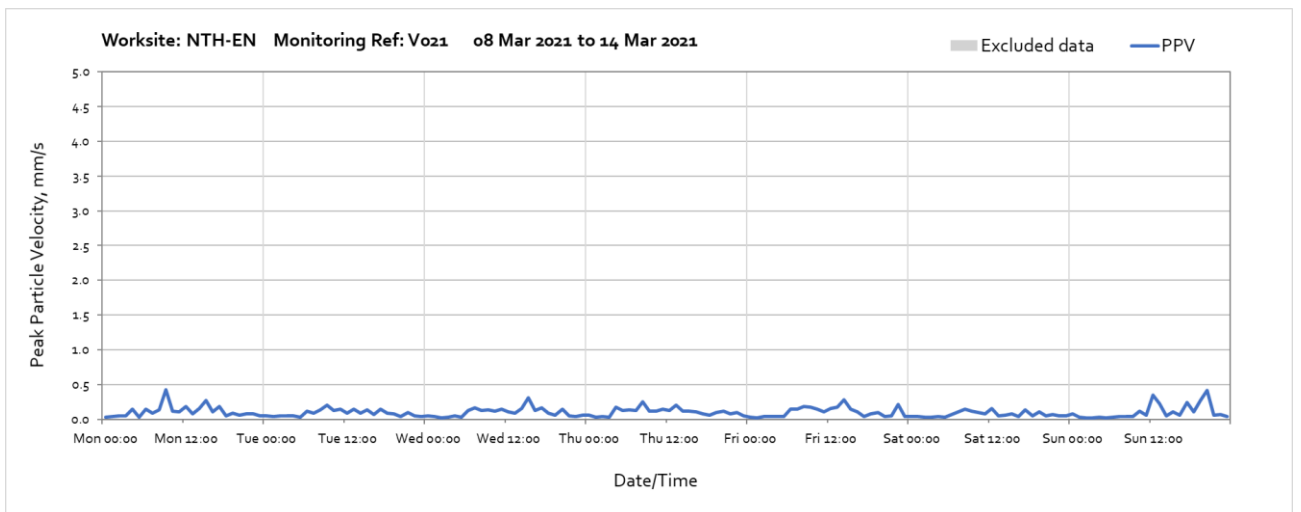
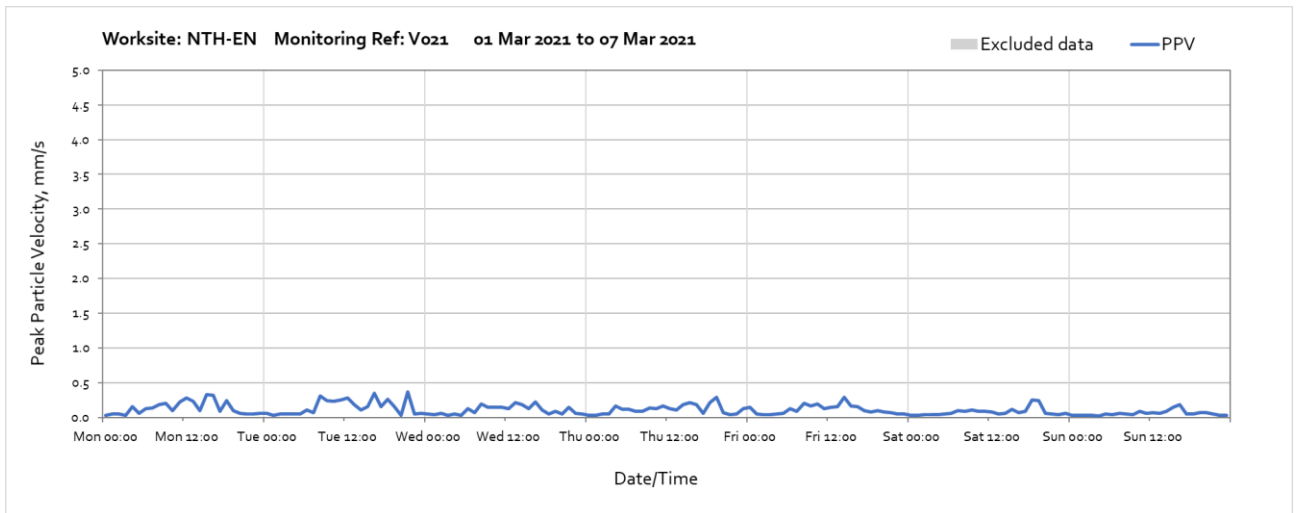
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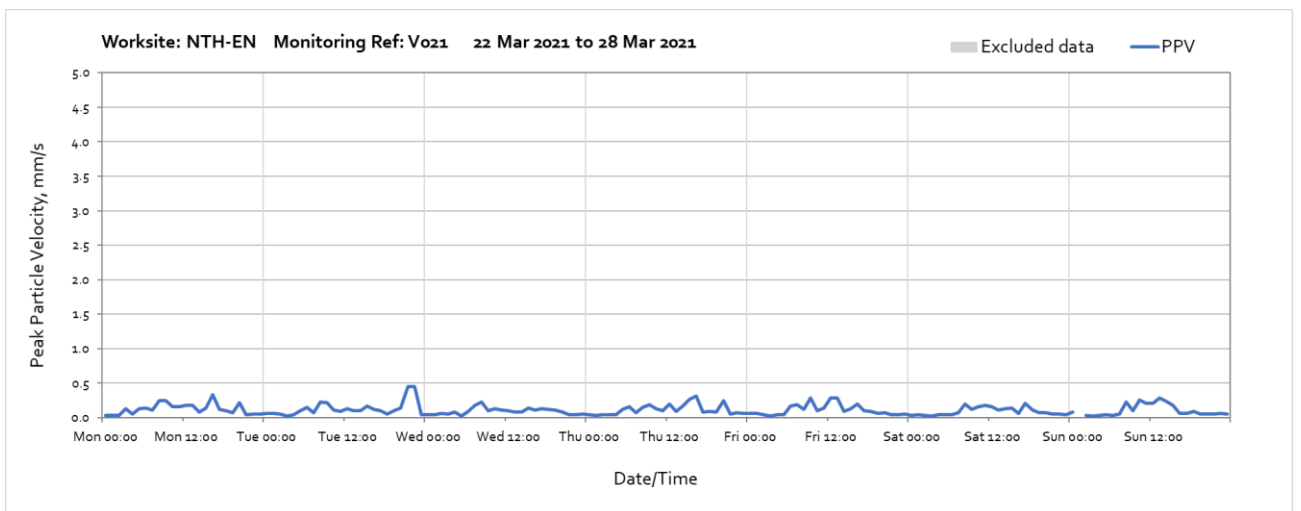
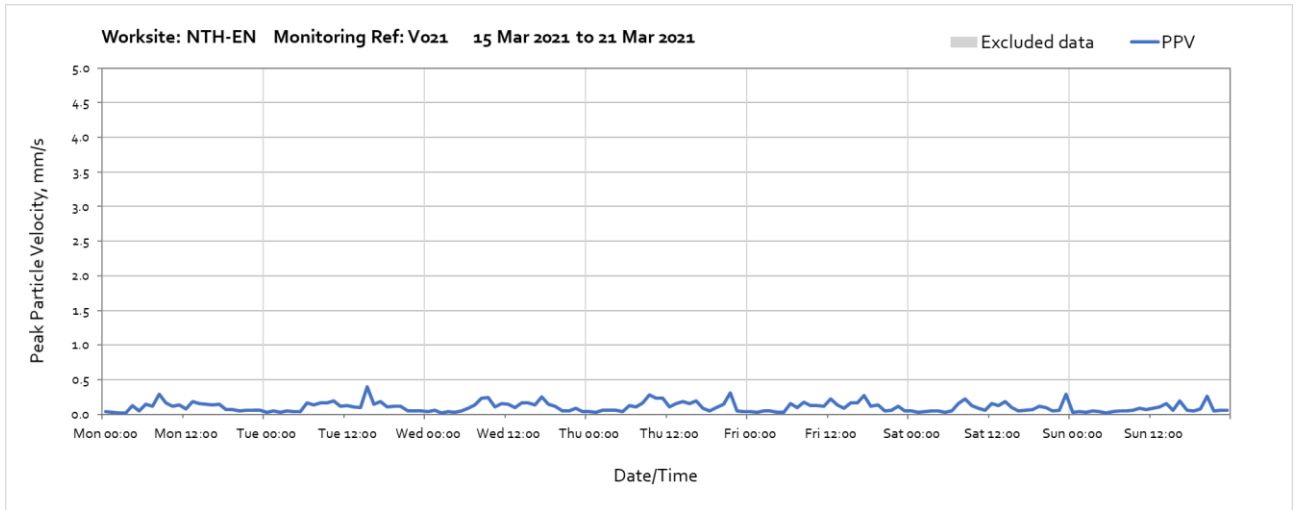


Note: Missing data between 01:00 and 02:00 on Sunday 28th March was due to the clock change (start of BST).

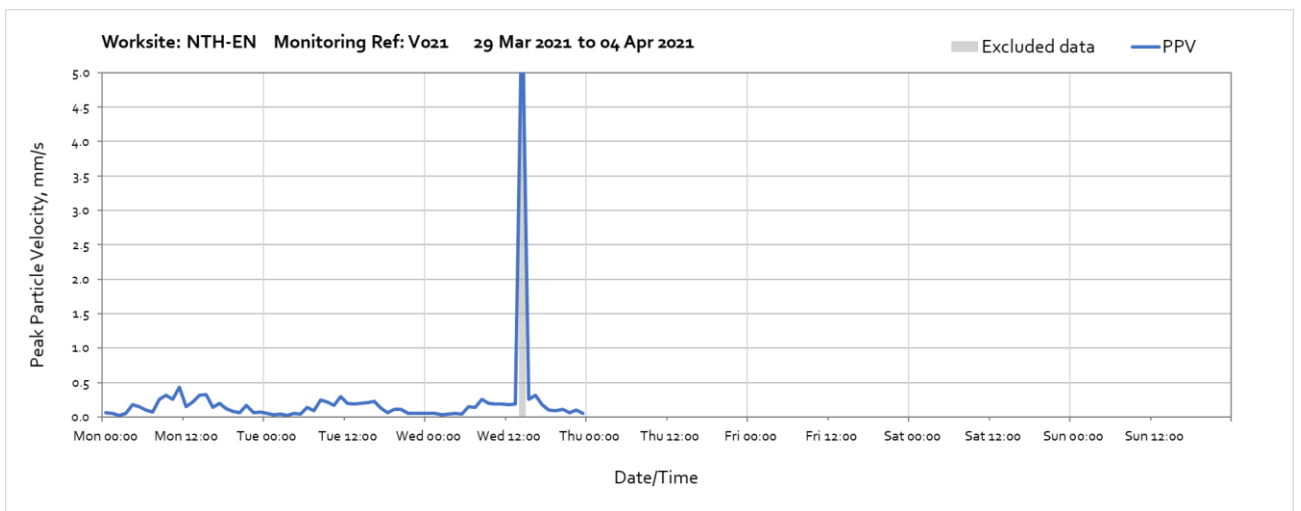


Worksite: NTH-EN – Monitoring Ref: V021



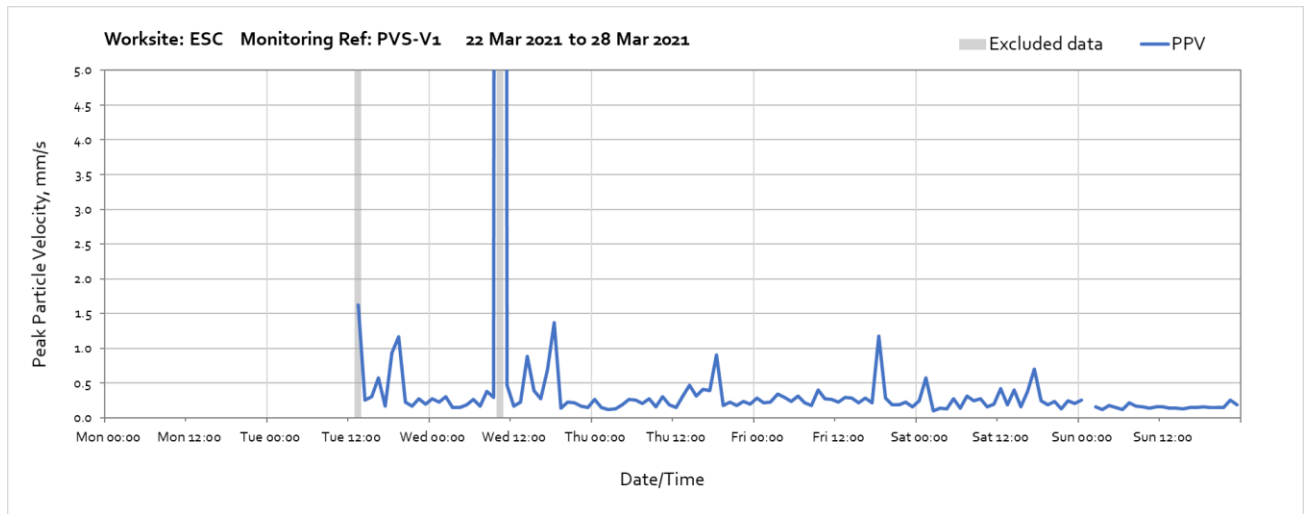


Note: Missing data between 01:00 and 02:00 on Sunday 28th March was due to the clock change (start of BST).

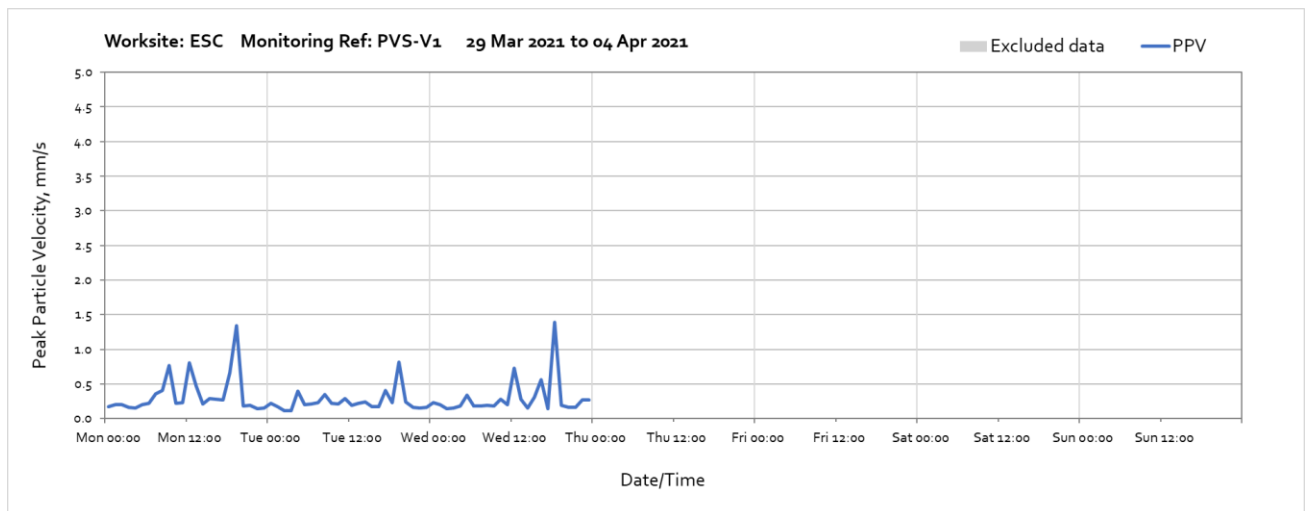


Note: High vibration levels at 14:00 on Wednesday 31st March were due to routine maintenance of the monitoring station and are not representative of HS2 vibration levels.

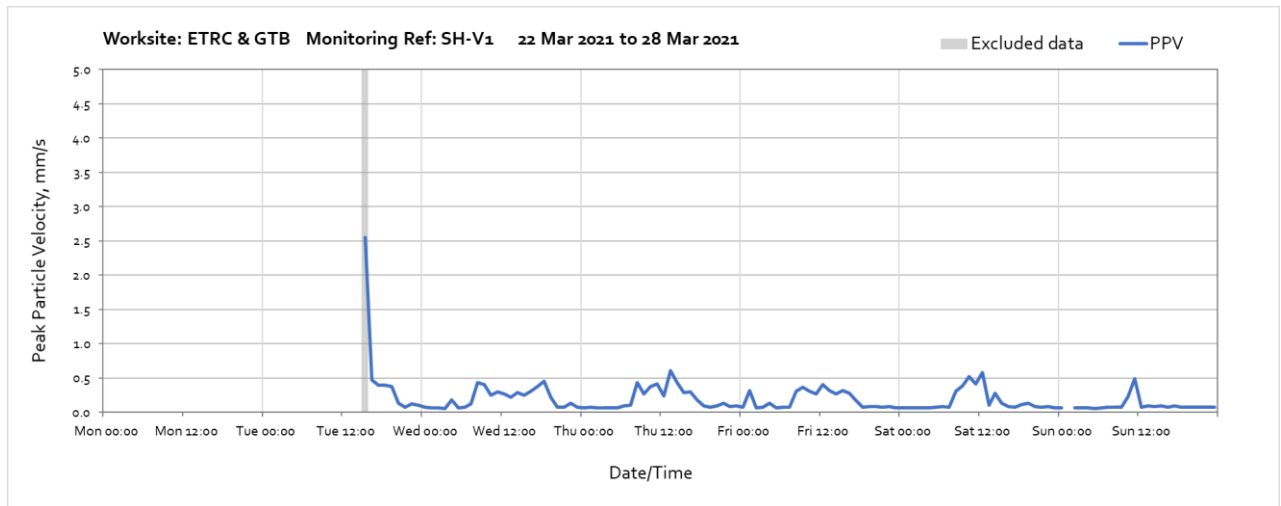
Worksite: ESC – Monitoring Ref: PVS-V1



Note: Monitor was installed at 13:00 on Tuesday 23rd March. High vibration levels at 13:00 on Tuesday 23rd March were due to the setup of the monitoring station. High vibration levels measured between 10:00 on Wednesday 24th March was due to local interference of the monitor and are not representative of HS2 vibration levels. Missing data between 01:00 and 02:00 on Sunday 28th March was due to the clock change (start of BST).



Worksite: ETRC & GTB – Monitoring Ref: SH-V1



Note: Monitor was installed at 15:00 on Tuesday 23rd March. High vibration levels at 15:00 on Tuesday 23rd March were due to the setup of the monitoring station and are not representative of HS2 vibration levels. Missing data between 01:00 and 02:00 on Sunday 28th March was due to the clock change (start of BST).

